The Builder.

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Queen Victoria High School, Stockton-on-Tees ..... Mr. Felix Clay, Architect.
Business Premises, Holborn ..... Mr. Charles Waymouth, A.R.I.B.A., Architect.
Design for a Garden by a River ..... By Mr. John Stevens Lee.

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The Parish Church of Ashburne.

IN one of the earliest chapters of the "Life of George Eliot" occurs the sentence—"Father indulged me with a sight of Ashburne Church, the finest rural parish church in the kingdom." This praise is too high, for there are certainly several parish churches, if not of greater size, of more diversified architecture, and of finer general effect. Nevertheless, the Church of St. Oswald, Ashburne, may with justice be included among the first score of England's parish churches; for the peculiar grace of the central spire, and the beauty of the whole outline, notwithstanding the meagre character of the nave, fully entitle the fabric to the title of "The Pride of the Peak," which was conferred on it towards the beginning of the last century.

The general charm of the church, in part owing to its situation, has long ago been recognised. Ray, in travelling through Derbyshire in 1658, though he had complained of the condition of Derby's five churches, which he found "decayed and ready to drop down," on reaching Ashburne, wrote, "There is a very fair church, built cathedral-wise." In the next century it was described and roughly illustrated both in the *Gentleman's Magazine* and in the *European Magazine*. Dawson and Hobson's "History of Ashburne," a creditable work, published in the "thirties" of last century, supplied two interesting engravings of the church in its old state, one of the exterior and the other of the interior. This was followed by the large folio publication of the Rev. S. T. Mosse, then curate of Ashburne, with poor letterpress, but a variety of lithographed plates showing the results of the "restoration" of 1840. The British Archæological Association visited Derbyshire in 1851, and a good paper on this church appeared in their journal of the following year. The early history and description of this church form a prominent feature of the second volume of the Rev. Dr. Cox's "Churches of Derbyshire," issued in 1877. Since that date a paper on the records of the church, and an account of restoration work, were contributed to the Derbyshire Archæological Society's Journal by the late Rev. F. Jourdain when he was vicar of Ashburne.

Notwithstanding all this, the history of this church, both in records and in stone, is so exceptionally full and interesting that it is well worthy of a monograph, which yet remains to be written. Its history, for our present purpose, may be condensed into a single paragraph.

A church and a priest of Ashburne are named in the Domesday Survey. A few years later (1093) William Rufus gave the church and its numerous chapelries to the cathedral church of Lincoln. In the following century an early vicarage was here established, but the vicar took all the emoluments on condition of paying an annual pension of 100 marks to the Dean of Lincoln. In 1241 Bishop Patishull modified this arrangement, made elaborate provision for the nine important chapelries (all of which, save one, had been for a long period independent parishes), and provided that the vicar should personally reside, and serve the great central church of Ashburne, with a staff of two chaplains and a deacon and sub-deacon. Henry III., towards the end of his reign, seized on the advowson of this church, and gave it to the abbey of Vale Royal; but Edward I., in 1277, restored it to Lincoln. From that date until early in Victoria's reign, when the advowson was transferred to the Bishop of Lichfield, the patronage of Ashburne remained with the Lincoln chapter. Within the church were two important chantries founded in the fourteenth century.

The church consists of a large chancel of four bays; north and south double transepts; and nave, with south aisle, of four bays. From the central piers rises a fine tower, surmounted by a spire which attains to a height of 210 ft. The chancel is 65 ft. by 25 ft., the total length of the church 180 ft., the transepts are 85 ft. by 40 ft., and the width of the nave and aisle 50 ft.

Of the Saxon church, and of its successor, given by William Rufus to Lincoln, there are now no remains, save that of the Norman structure there are a considerable number of stones in the present fabric that bear the unmistakable marks of Norman axeing. These can be best noticed in the interior of the central tower, where the stones of the Norman church were freely used; here, too, at least, five fragments of Norman moulding can be detected. A large number of Norman moulded stones were also found in the restorations of 1840 and later dates.

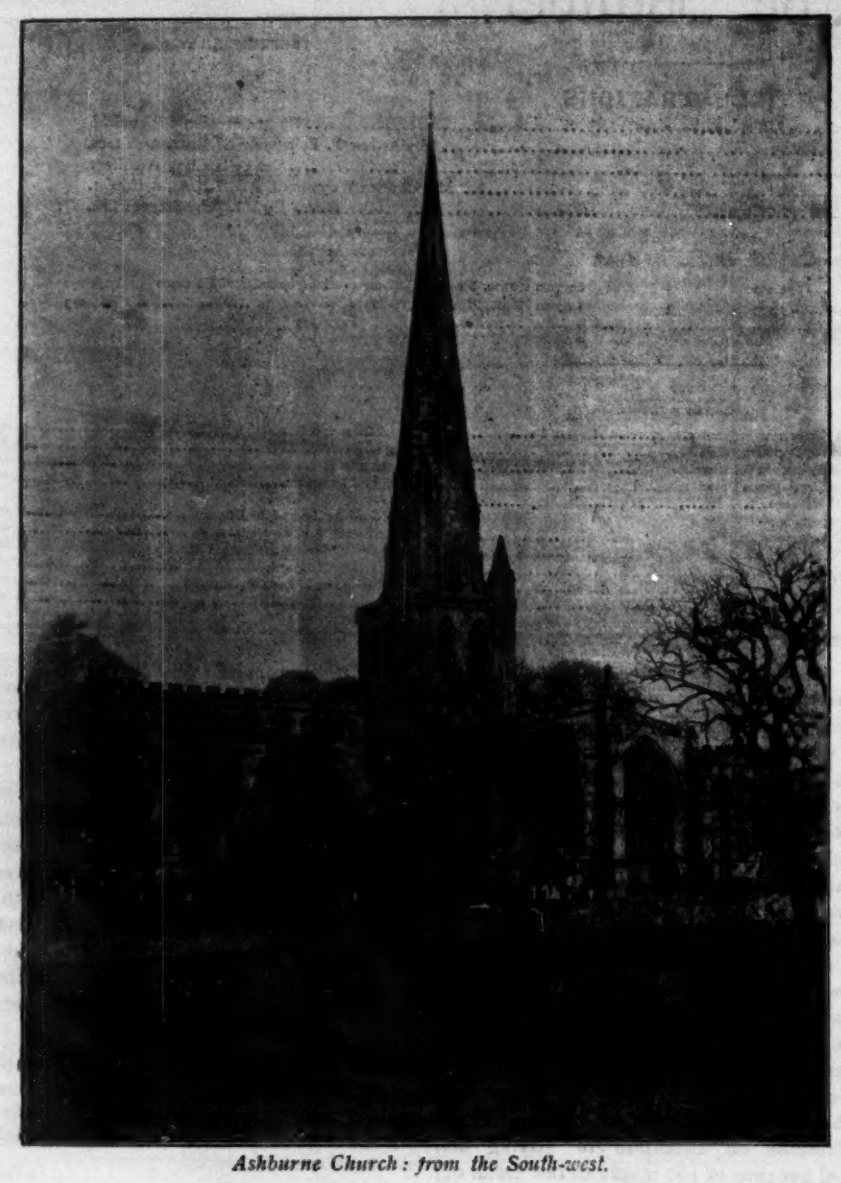
The chancel and transepts were rebuilt on a fine scale in the first half of the thirteenth century. This is one of the very few cases in which a dedication inscription has been preserved, whereby the exact date of the completion of an important architectural work can be settled. A small brass plate, beautifully engraved with a short inscription in Lombardic capitals—which has often been carelessly transcribed—states that:—

"Anno ab incarnacione Domini MCCXLI. viii kl. Maii dedicata est hec ecclesia et hoc altare consecratum in honore Sancti Oswaldi regis et martiris a venerabili patre domino Hugone de Patishul, Coventrensi episcopo."

There can be no doubt that this plate was originally fixed to the high altar or on the wall near by; but after a temporary sojourn at Ashburne Hall, and after having been fastened in two different positions in the centre of the church, it is now to be found inappropriately placed in the sacristy of the south transept.

This Early English work, completed about the end of 1240, was probably begun, as Parker in his "Glossary" conjectures, about five years earlier. It synchronises with some of the very best work of the period, such as the presbytery of the cathedral church of Ely, part of the west front of Peterborough, the church of St. Neots, Huntingdon, and the choir of the Temple church. Although Ashburne lacks some of the elaboration of design distinctive of these masterpieces, still enough remains to show the peculiar elegance and refinement of the work here accomplished at the cost of the chapter of Lincoln Minster.

By far the greater part of the walls of the whole church, save nave and south aisle, are those that were consecrated by Bishop Patishull in April, 1241, though in various places pierced with windows of a later date. On each side of the chancel are three pairs of coupled lancet windows, 21 ft. in height. The buttresses and base-moulds are also effective examples of the style; they have been considerably but carefully restored. The priests' doorway in the third bay on the south side is part of the original work, though the jamb-shafts were spoilt by bad



Ashburne Church: from the South-west.

restoration in 1840. A low blocked-up doorway should be noticed in the second bay on the north side; this probably led into a small sacristy or treasury, of later addition, but which long ago disappeared. In the east wall of the north transept are two good windows of triple-lancet formation; the west wall of this transept also retains the original lancets. On the east side of the south transept triple lancets, of which there is some slight trace, remained till early in the eighteenth century. On its west side the original lancets still remain, though partially blocked up by the later south aisle of the nave. The south entrance to this transept is a fine example of Early English work, having the characteristic dog-tooth ornament carried round the dripstone and downward between the jamb shafts. To this period, too, belongs the font, which, after many movings, has now found a resting place at the west end of the south aisle. The font is a fairly good, but not elaborate, specimen of the style; it stands 3 ft. 4 in. high, and the bowl has a diameter of 2 ft. 11 in.; it is engraved in Paley's "Illustrations of Baptismal Fonts."

It is quite clear from a careful study of this building, compared with its records and the accounts of the various restorations of last century, that there stood here, in Norman days, a fair-sized cruciform church with a central tower and of good proportions. The present tower-piers shown on the plan have a kernel of earlier Norman work; the nave would be about the length of its successor; the transepts, with perhaps apses on the east, would be only the same width as the low central tower or lantern, and the chancel would not extend further than about the first bay of that which is now standing. The work that was carried out *c.* 1235-1240 brought about the erection of a chancel and transept on a much more imposing scale. The high altar being moved considerably further to the east necessitated the reconsecration of 1241. The Norman nave, which must have been aisleless from the extent of the thirteenth-century work and windows on the west sides of the transepts, would be used for divine worship during the rebuilding of the rest of the fabric. It was probably in good repair, and there was no immediate idea of carrying out the new plan in that direction. There can be no doubt that the building of a central tower was intended to be at once taken in hand, but certain circumstances arose that hindered its execution for a considerable period.

In the case of Ashburne, of whose church there are so many records among the valuable capitular muniments of Lincoln, the written history illustrates the history in stone after a most interesting fashion. The skilled ecclesiologist has no difficulty whatever in deciding from the details of the fabric that the nave, with its south aisle, was the gradual work of the days of Edward I., begun in the north wall nearest to the transept, about thirty or forty years after Hugh Patishull's consecration. Now the records tell us that Henry III. claimed the advowson, and made an illegal appointment in 1260, notwithstanding the very handsome bribes held out to him from Lincoln. In 1269 the church was re-bestowed on a distant abbey, and it was not until 1278 that Edward made formal restitution of Ashburne to the Lincoln chapter. No one would expect that any further work at the fabric would be taken in hand during this period of distraction; and what is more natural than that the Lincoln authorities should be ready to signalise their resumption of the charge of this important preferment in 1278 by again finding funds for certain extensions?

The idea at first seems to have been to simply build a nave in the newer style on the Norman lines, so as to gain greater light and afford more scope for the display of painted glass; but before the work was finished, or soon afterwards, it seemed desirable—perhaps some benefactor found special funds for the object—to increase the nave accommodation by the addition of a south aisle. This was effected about the close of the thirteenth century, or beginning of the fourteenth, with the result of somewhat spoiling the south transept. The four niches between the windows on the north side of the nave should be noticed; two of them have trefoil and two cinquefoil heads. The lines of a north doorway, blocked up in 1840, can be traced below the second window from the west end. The windows of the south aisle mark a distinct advance on those of the north side of the nave, and are of a decidedly Decorated style. The second one from the west is modern imitation, and supplies the place of a large two-storied porch—a feature sadly lacking in the present structure—which was unhappily destroyed during the 1740 alterations.

Other work of the Decorated period, pertaining to the earlier part of the fourteenth century, may be noticed elsewhere, as in the two windows inserted in the west bays of the chancel. The two north windows of the north transept are of this period, though of different dates; the later of the two, that towards the east, is of rather poor design, but the other one is a really beautiful example of reticulated tracery. The doorway below this beautiful window is of debased and imitative design. Above the Early English doorway of the south transept already mentioned is an exceptionally fine seven-light window of the latter part of the reign of Edward III.; it has been compared with the great window of Melton Mowbray church, Leicestershire, but its proportions are not of the best, as it lacks length, owing to its position over the doorway.

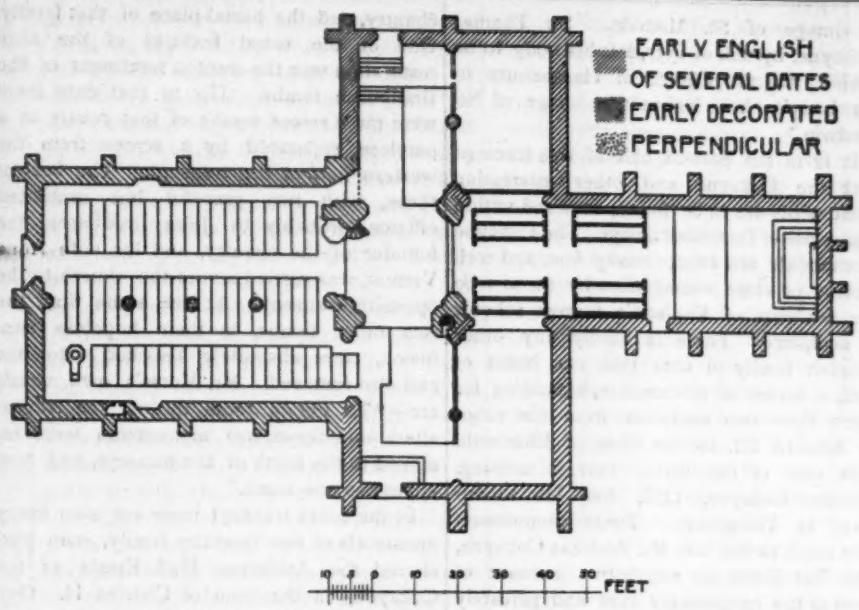
The special feature, however, of the earlier Decorated work of this church is the central tower and spire. The tower with its fine double belfry windows arises to a considerable elevation above the building. The newel staircase is in the south-eastern angle, which is surmounted by a lofty crocketed pinnacle. The parapet of the tower, renewed after the old design, is effectively pierced with a trefoil pattern. From within this parapet rises the lofty octagonal spire of exceptionally graceful proportions. The moulded ribs that run down the angles of the spire are enriched with the ball-flower ornament; it is pierced with twenty windows, in five tiers of four. It has often

suffered from its exposed position, and the few feet at the summit have been several times renewed; nevertheless, in its main features it is practically the same spire as that which left the builders' hands six centuries ago. Dr. Pegge, in his MS. collections at the Heralds' College, tells of serious damage that was done to the tower and spire in a gale of wind in February, 1698. The most extensive repair to the spire was in 1706, when 21 ft. of the summit was renewed.

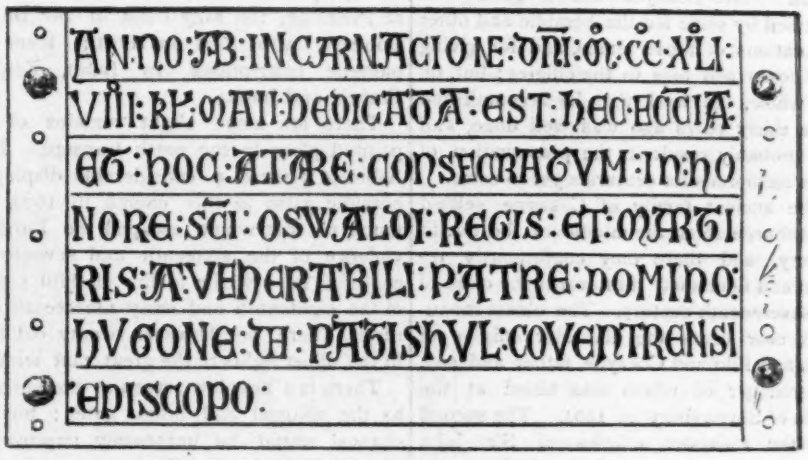
The church gives considerable evidence of alterations during the fifteenth and early sixteenth centuries. The old high-pitched roofs, plainly shown by the weather mouldings on the tower, were removed; the walls of chancel transepts and nave raised 3 ft.; ranges of square-headed windows inserted above the old ones in the north transept and in the clearstory of the nave; and the whole fabric recovered with the almost flat roofs of the Perpendicular style. On the south side of the south transept, in the eastern portion, is an effective Perpendicular window of seven lights. There can be but little doubt of the exact date of this window, for the Bradburne choir was founded in this part of the church in 1483. The great east window of the chancel, also of seven lights, is of very similar design. The great west window of the church was a much poorer style, probably *temp.* Henry VIII.

With regard to repairs of the eighteenth century, memoranda in the registers state that the nave roof was all made new, both in timber and lead, "from the steeple to ye great western window, in 1706"; that the Bradburne choir was renewed about 1710, and "the south end of the crossile" rebuilt in 1720.

The building endured a whole series of restorations during the nineteenth century. In 1839-40, 4,000*l.* was spent on the church; this great sum (for that period) was chiefly raised through the energy of Mr. Moore, at that time curate of the parish. There is no doubt that the comparatively poor taste and small knowledge of these renovators did certain mischief to the building, and there was not a little vandalism in connexion with monuments; but it should not be forgotten that they accomplished a most beneficial work in sweeping away many abuses that made the church of Ashburne a special scandal even in the earlier times prior to 1840. When Mr. Moore became curate in 1830, "the church was cold, damp, deserted, and deformed. The two elegant Early English windows to the monumental chapel, and all the lancet windows on the north side of the chancel, were closed up with masonry . . . . The chancel was completely cut off from the nave and aisles by a coarse screen of lath and plaster encompassing the organ; and eleven different flights of steps led to as many cumbrous lofts, one of which on the north side of the nave the late learned Bishop Ryder called 'the sixpenny gallery.' The approach to this was extremely grotesque; a viaduct of brickwork was constructed on the outside, and those who came to worship entered through the upper part of a handsome window, the mullions forming the casement of the door." The worst work of 1840, although the multiplicity of deforming lofts were cleared out of the nave, was the insertion of side and west galleries in the nave, supported on iron girders; they cut the windows in two and did other damage to the fabric.



Plan of Ashburne Church.



Brass with Dedication Inscription, Ashburne Church.

In 1876-8 the chancel underwent restoration at the hands of Sir Gilbert Scott. The vicar, churchwardens, and leading inhabitants signed a petition to Mr. Errington, the lessee of the great tithes, who was finding the funds, begging that the high-pitched roof might be restored, but Sir Gilbert refused, and the high blank walls above the lancets still remain. There was much to be said on both sides, but certainly the beauty of the chancel must have been far greater in its original proportions. The incongruity of this has been made all the more manifest on the north side, for, under the direction of the Rev. F. Jourdain, then vicar, the double high-pitched gables over the north transept were replaced, in accordance with the tower weather mouldings, in 1879-80. It was almost a pity to do this unless the chancel was to undergo like treatment.

In 1881-2 considerable works were undertaken under the immediate direction of Mr. Jourdain, which much altered and in many ways improved the building and its interior effects. The galleries were removed from the nave, and the handsome arcade between the nave and the south is now well seen. The undignified west window, prolonged in 1840, was removed, and a window of five lights, intended to harmonise with the north windows of the nave, took its place. A west doorway of considerable magnitude, 14 ft. high by 7 ft. wide, was introduced into the west end of the church, designed from fragments that had been built into the walls by the 1840 restorers when that doorway was abandoned; but it is doubtful whether these were not in reality the fragments of the entrance to the south porch removed at the same time. Care was taken to insert this doorway, though somewhat awkwardly, so that "the worshipper who enters by this doorway finds himself, in spite of the irregularity of the building, exactly opposite to the altar." A good deal was sacrificed and much ingenuity exercised to produce this effect, and to ensure, at the cost of other awkward irregularities, an absolutely straight line from the west door to the centre of the high altar at the far end of the long chancel.

In the south wall of the chancel are three sedilia of thirteenth-century execution, with a small piscina under a trefoil niche. In the north wall, opposite the sedilia, is a sepulchre recess, with a richly ornamented arch and crocketted pinnacles of fifteenth-century date. It was doubtless designed to serve for the Easter sepulchre rites, and at the same time probably served, as was not unusual, for the tomb of a benefactor. The supposition, based on tradition, that here Robert Kniveton, who died in 1471, was buried is most likely correct.

In the south wall of the south transept is a double piscina, now much restored. In the north wall of the north transept or Lady-chapel is a curiously carved stone bracket of Early English date with a face or mask of almost Egyptian type. Here probably stood

an image of St. Modwin. Sir Thomas Cokayne, by will of 1357, left his body to be buried "in the Church of Hassheburn in my Lady's choir before the image of St. Modwin."

It is in the eastern half of this transept that the Cokayne and other interesting monuments are to be found, enclosed within a parclose of Decorated design. The Cokayne monuments are exceptionally fine, and well worthy of close examination by those who are students of England's former schools of sculpture. There is hardly any other English family of note that can boast of such a series of monuments, extending for more than two centuries from the reign of Edward III. to the close of Elizabeth. The one of the series that is missing, Thomas Cokayne, 1488, has his monument at Youlgreave. These monuments owe much to the late Mr. Andreas Cokayne, who has given an exhaustive account of them in the exceedingly rare and privately printed second series of "Cokayne Memoranda." Mr. Cokayne was a good deal ridiculed by some for the heraldic and other restorations of these tombs, and for giving new noses and toes to the effigies; but, on the whole, the work that he accomplished some thirty years ago was well done, and will probably result in the preservation of these memorials for centuries yet to come.

The ancient family of Cokayne settled at Ashburne about the middle of the twelth century, and there they continuously resided and flourished till towards the close of the seventeenth century. The oldest monument now bears the alabaster effigies of John and Edmund Cokayne, father and son, the younger of whom was killed at the battle of Shrewsbury in 1404. The second has the alabaster effigies of Sir John Cokayne (Edmund's son), who died in 1477, and his first wife. The third is an inscribed alabaster slab to Sir John Cokayne, son of the last named, who married a Vernon of Haddon, and died in 1505. Thomas, their eldest son, is buried, as already mentioned, at Youlgreave. The fourth commemorates Thomas's son, Sir Thomas Cokayne, one of the most celebrated of the family, and his wife, Dame Barbara; he was knighted on the field of battle by Henry VIII., at the siege of Tournay, and was the author of "A Treatise on Hunting." Sir Thomas and his wife are portrayed in incised effigies on a raised slab of alabaster, bearing this inscription:—

"Here lieth Sir Thomas Cohayne
Made Knight at Turney and Turwayne
Who builded here fayre houses Twayne
With many profettes that remayne
And three fayre parkes impaled he
For his successors here to be
And did his house and name restore
Whiche others had decayed before
And was a Knight so worshipfull
So veertuous wyse and pitifull
His deeds deserve that his good name
Lyve here in everlasting fame.
Who had issue iij sonnes iij daughters."

Sir Thomas Cokayne died in 1537, and was succeeded by his son Francis, who only survived his father for a year. In memory of Francis and Dorothy, his wife, there are good brasses, which have been carefully restored. The last of these monuments is the stately mural monument to Sir Thomas Cokayne, son of Francis, and his wife Dorothy, daughter of Sir Humphrey Ferrers, of Tamworth; he died in 1544.

In the south transept was the Bradburne chantry, and the burial-place of that family. One of the worst features of the 1840 restoration was the wanton treatment of the Bradburne tombs. Up to that date there were three raised tombs of that family in a parclose separated by a screen from the western half of the transept. The best of these, with two graceful but mutilated effigies, probably to John Bradburne, the founder of the chantry, and his wife Anne Vernon, was carried across the church to the opposite transept. At the same time the two other tombs, to their hopeless confusion, were absolutely knocked into one and also removed. Mr. Morse's own words are—"To obtain room during the recent alterations, these two monuments were removed to the south of the transept, and now appear as one tomb."

In the south transept there are also many memorials of the Boothby family, who purchased the Ashburne Hall Estate of the Cokaynes in the time of Charles II. One of these is the sculpture of the Sleeping Child, by T. Banks, R.A., to the memory of Penelope, the only child of Sir Brooke Boothby, who died in 1791; there are pathetic inscriptions in Latin, English French, and Italian.

There are some slight remains of old painted glass in the north transept. Elias Ashmole noticed a considerable display of heraldic glass in this church in 1662, but much of that which escaped the Puritanic violence of the sixteenth and seventeenth centuries fell a victim to the slothful neglect of the eighteenth and early nineteenth centuries. There are, however, twenty old coats in the upper lights of the great east window.

There is a new low screen at the entrance to the chancel and brass gates; but the chancel would be immensely improved in general interior effect by the re-erection of a lofty canopied screen, of which there used to be abundant traces in the stonework. The choir stalls are new, but some of the old ones of late fifteenth-century design, which were discarded in 1840, have been recovered, and are now in the south transept.

At the west end of the church various traces of bullet marks of a skirmish during the Great Civil War still remain; and in the sacristy is a small cannon-ball that embedded itself in the church tower in 1644.

NOTES.

The British Association Address.

IT has been a not uncommon course for the President of the British Association, when he happens to be a prominent exponent of some important branch of science, to make his address a kind of summary of the history and present position of his own science. Had Sir Norman Lockyer done this, we should have had no doubt a very interesting and masterly exposition of some of the leading problems of modern astronomy; and we confess that we should have been more interested in hearing him on this subject than on the general plea for the extension of university teaching and opportunity which formed the main subject of his address. It is an important subject, but one on which much has been said of late; and though Sir Norman Lockyer helps to drive the nail in by repeating the warning that trade follows brains, and that we have shown a false economy in respect of technical education and thereby allowed other nations, the Germans especially, to get the advantage of us, it hardly required a British Association meeting to deal with so obvious a truth. However, we may hope that the address will have some practical result, in preparing the country and the Government for a more liberal policy in regard to national technical education.

The Iron and Steel Institute.

AT the summer meeting of the Iron and Steel Institute, last week, several interesting subjects were introduced for discussion. The heat treatment of steel is a question at present occupying much of the attention of metallurgists and engineers, and in a paper on "Sorbitic Steel Rails," Mr. J. E. Steed showed how certain desirable qualities may be secured by converting the constituent "pearlite"—carbide of iron in association with iron—into what is termed "sorbite." This is effected by heat treatment, and not by altering the constitution of the material. When heated to a certain temperature, the carbon contained in the steel dissolves into the iron, and although the cause is not known, the result appears to be that the steel becomes more completely homogeneous. This treatment is recommended by the author for steel tyres, axles, bolts, and other objects. For the production of sorbitic rails, re-heating is not required, as the heads are quenched to the critical temperature as soon as they are sawn to length. The result is said to be an increase in strength of from 37 tons tenacity for the normal rail up to 45 tons for the sorbitic rail. The wear is also greatly in favour of the latter, and the author believes the improvement will be as much as 50 per cent. A paper read by Mr. C. H. Ridsdale on the "Diseases of Steel" opened up a very large field for discussion, the object of the author being to collate various types of faults and defects to which steel is subject, and to append some of the main data known as to peculiarities of the metal. There is no doubt a great deal to be learned upon this subject, but at the present time the best safeguard for the engineer is to insist that the steel maker shall supply steel of a certain analysis from which he knows trustworthy material will result. Among other papers we may refer to one upon "Weldless Steel Tubes," by Mr. Ehrhardt, of Dusseldorf. Our readers are, of course, aware that steel tubes of moderate diameter can be obtained without difficulty in this country, but it is not so generally known that tubes or cylinders are now being made in Germany up to 8 ft. in diameter, and 10 ft. in length. Such cylinders are admirable for steam boilers, and other plant, owing to the avoidance of riveted joints, which always constitute an element of weakness and possible leakages. The chief difficulty in the way of making large diameter pipes and cylinders was the piercing of ingots of large diameter and considerable length, as a preliminary to rolling out in the mill. This has been surmounted, and it is stated that seamless rings can now be produced more cheaply than welded or riveted rings.

The Metric System.

A CANVAS has recently been made among the members of the American Society of Mechanical Engineers as to the desirability

of adopting the metric system. Over 500 members voted, a large proportion being distinctly opposed to any change, the objectors being about equally distributed among all the classes taking part in the inquiry. A series of questions were asked, the members being classified in groups—such as railroad men, draughtsmen, mechanical and consulting engineers, teachers, and miscellaneous business men. The most practical question was, "Would the substitution of the metric system for the English be detrimental to your business?" There were 242 replies in the affirmative, and 145 in the negative, while eighty-nine members replied that it would be an advantage. It is instructive to note that the mechanical and consulting engineers voted as under on this point:—"Would be detrimental," 56; "would not be detrimental," 47; "would be an advantage," 28; while the votes of the miscellaneous business men on the same questions stood at 125, 47, and 25 respectively. Even the teachers voted with the majority, averse to any change; and, altogether, the result of the canvas must be rather unpleasant reading for advocates of the metric system.

Railway Amalgamation.

WE took the occasion to point out last year (27th December) that co-operation between rival companies in facilitating through passenger traffic from one system to another would lead to large increase in passenger receipts; the present obstructive policy of rival companies discourages the travelling public, and is a policy injurious to the railway companies themselves. It is, however, a principle so ingrained in railway management that it seems ineradicable. A notable example of this false policy is to be found in the action of one of the Southern companies, which, although it professes to have amalgamated two rival systems, has failed to amend its time tables, thus rendering passage from one part of the system to another as difficult as it was when the two companies were engaged in keen rivalry. The sooner the shareholders of all lines draw the attention of their boards to the advantages to be gained by co-operation in passenger traffic, by so much sooner will the dividends increase, and the risk of competition also be lessened.

Carriage of Goods by Electric Tramways.

SOME of the questions involved in the carriage of goods by electric tramways are discussed in an interesting paper by Mr. A. H. Gibbings which has just been published in the Journal of the Institution of Electrical Engineers. The electric tramway system of South Lancashire is a very important one, and Liverpool, Blackburn, and Manchester are all linked together by it. Mr. Gibbings gives illustrations of two forms of trucks which should prove adequate for all purposes. One is an American express car suitable for conveying miscellaneous goods, and the other is a novel form of car with detachable top which can be removed bodily by means of a crane in a somewhat similar manner to that adopted by the South-Eastern Railway Co. in conveying passengers' luggage to the Continent without unloading. Such a system of goods conveyance would prove lucrative to the tramway company, and would be appreciated by manufacturers. It seems to us that very special precautions would have to be taken when a motor-truck and trailer—weighing together about 30 tons—were going down an incline, and the most powerful magnetic track brakes would have to be provided. In single-line sections, also, some system of automatic signalling with semaphores and red and green lamps fixed to the trolley standards would have to be adopted, as it would be hardly feasible to keep signalmen on duty all night at every turn-out. An automatic system of signalling has been in operation on the Portsmouth tramway for a year, and several tramways have adopted a system of automatic cut-outs when their lines run through level crossings. In the latter case, the mere closing of the railway gates cuts off the current from the trolley wire for a certain distance on either side of the crossing. An influential committee has been formed in furtherance of a general scheme of goods conveyance by electric tramways in South Lancashire, and as it seems to us that this method of conveyance will be quieter and more expeditious than the present horse-lorry system, we wish the committee success.

Portland Slag Cement.

IN a recent United States Consular Report it is stated that the manufacture of Portland cement from blast-furnace slag and limestone in Germany and Belgium has proved successful, and that negotiations are now being carried on to establish the industry in England. It is claimed that Portland cement can be manufactured more cheaply from slag and limestone than from the materials at present employed; and that, owing to the uniformity in the composition of the slag, the finished product is less liable to variations in composition, and is therefore more trustworthy. Mortar made with slag cement in the proportion of three parts sand with one part cement had a tensile strength of 383 lbs. per square inch after seven days' hardening, and a strength of compression of 3,880 ibs. per square inch. After twenty-eight days the strengths had increased to 551 lbs. and 5,441 lbs. respectively.

The Consistency of Concrete.

COMPARATIVELY few experiments have hitherto been made upon wet and dry concrete, and owing to the lack of data on the subject a series of experiments was conducted this year by Mr. J. W. Sussex, at the University of Illinois. Forty-five 6-inch cubes were made with three percentages of water, and broken in a testing machine at the ages of seven days, one month, and three months. The quantities of water used were:—For dry concrete, 6 per cent.; for medium concrete, 7.8 per cent.; and for wet concrete, 9.4 per cent., and the proportions of material adopted were 1 part cement, 3 parts sand, and 6 parts of broken stone. The dry concrete was about as moist as damp earth; the medium concrete would not quake in handling, but when well tamped water would flush to the surface; and the wet concrete quaked in handling, and would bear only slight tamping. From the published results of the tests in question we learn that at the age of three months or more wet concrete is stronger than either dry or medium concrete. When recently set, medium concrete gives the greatest strength, thus showing that wet concrete acquires its strength more slowly than drier mixtures. In breaking the cubes it was found that the wet concrete was distorted more than the dry before failure occurred, thus proving the existence of greater elasticity. By using a rather wet mixture a compact mass could be obtained with comparatively little tamping, whereas a compact mass could not be formed with any amount of tamping upon a dry mixture. Summing up the conclusions to be drawn from the experiments, it appears to be clear: (1) That dry concrete should not be used under any circumstances. (2) That medium concrete may be desirable in cases where immediate strength is required. And (3) That wet concrete is stronger than either dry or medium concrete at any age over three months.

Blast-Furnace Gases.

FOR many years the fact has been realised that the blast furnace is practically a huge gas producer, and partial utilisation of the fuel formerly wasted has been extensively practised in Great Britain and in other countries. More recently considerable progress has been made in utilising blast-furnace gases by means of the internal-combustion engine. As Mr. Humphreys showed in a recent paper, there were in operation at the end of the year 1902 fully 327 gas engines capable of developing an aggregate of more than 180,000 h.-p., and at the present time it is probable that the engines already built or in course of construction represent a total of some 220,000 to 230,000 h.-p., most of these engines being operated or intended to operate with furnace gas. In iron and steel works the waste gas is chiefly used for firing boilers supplying steam to steel plant, rolling mills, and other machinery. The fact is now recognised that this is a roundabout method, and there is reason for believing that the continued improvement of large gas engines will ultimately render the use of steam unnecessary in large iron-works. As an indication of movement in this direction we may mention the fact that the Buffalo works of the Lackawanna Steel Co., U.S.A., are now being equipped with three new plants, one including eight 1,000 h.-p. gas engines for driving dynamos, and two others having sixteen 2,000 h.-p. engines for driving blowing engines.

Vibration from Engines.

WHEN vibration is communicated to the building from adjacent or adjoining premises where a steam or other engine is running, it is essential that careful consideration should be given to the whole of the surrounding circumstances, and that the nature and probable influence of the soil should be duly taken into account. The importance of the latter point is illustrated by an incident which recently occurred in a provincial town. The occupant of a house was considerably annoyed by vibration transmitted from a newly-equipped engine-house a short distance away. After interviews, followed by correspondence affording pleasant occupation for two lawyers, it was arranged that two architects, the parties to the dispute, and, of course, the lawyers also, should meet on the site. As not infrequently happens when experts meet on behalf of opposing

clients, one architect found the vibration to be very bad, and the other was unable to detect the slightest tremor, until the increasing oscillation of water contained in a wine-glass, set upon a window-sill, finally upset the vessel. Then it was agreed on behalf of the offending owner that a new engine-house should be built at a greater distance from the dwelling affected. This costly programme was carried out, but when the aid of an engineer was invoked upon some points of detail, it was discovered that all vibration could have been prevented from reaching the house affected, by the simple and inexpensive expedient of isolating the foundation from the surrounding soil, by digging a trench and filling it in with clay. Of course, a remedy that is satisfactory in one case may not be efficacious in another. For instance, it has recently been reported that vibration was transmitted from an engine bed founded upon clay, which is not a particularly favourable conductor of such motion. The procedure followed in this case was to sink cast-iron cylinders to an underlying stratum of chalk, afterwards filling the cylinders with concrete, so as to form foundations perfectly independent of the clay.

The Urft River Dam.

A MASONRY dam now in course of construction across the River Urft, near Aachen, in Prussia, is worthy of note, as one of the highest structures of the kind hitherto built. The object of the work is to afford summer supplies for irrigation, and to prevent damage from floods in the winter season. This dam has a total height of 190 ft., and will form a reservoir with a maximum depth of 174 ft., capable of holding up 1,600,000,000 cubic feet of water. The length of the dam is about 750 feet, and it is arched up stream on a radius of 650 ft. The cross section measures 18 ft. wide on top, and 165 ft. at the base. On the up stream side the face of the dam is vertical, for about half the height, the remaining part being battered to an angle of about 17deg. from the vertical. Against the up stream face a paved earthen embankment is formed. The dam is constructed of argillaceous slate laid in courses inclined against the line of pressure, and the up stream side is finished with a face wall of trap rock, backed with a layer of cement, and a lining of asphalt. Two tunnels passing through the earthen embankment place the gate chambers in communication with the reservoir, and beyond the valves water is conveyed in steel pipes, passing below the dam proper. An overflow weir, 300 ft. in length, is provided at one end of the dam, and facilities for an augmented discharge are furnished by gates at intervals. In addition to supplying agricultural requirements, the water stored in the reservoir will be employed for power purposes. A tunnel has been constructed leading to a valley, where water will be supplied under a head of 360 ft. to a power-house, in which eight 1,250-h.p. turbo-generators are to be installed for providing energy to the surrounding districts.

A Concrete-Steel Bridge.

A NEW bridge built at Laibach, in Austria, from the designs of Professor Melan, of Prague, presents some features that are worthy of notice by those interested in concrete-steel construction. The bridge is a three-hinged structure, the concrete hinges being formed of concrete hinge blocks, and the steel hinges consist of pins acting between cast steel shoes. Another detail in accordance with modern masonry bridge construction is the employment of relieving arches for the support of the roadway over the main arch. These secondary arches are formed of re-inforced concrete, but are not hinged. This bridge crosses the river at an angle of 9° 14′, the main arch having a clear span of about 108 ft., and a rise of 14 ft. 6 in. The roadway is 33 ft. wide, and the pathways for foot passengers are each 6 ft. 6 in. wide, the extreme width of the bridge being about 50 ft. With the object of securing a suitably artistic effect, an architect was commissioned to act in conjunction with Professor Melan. It was at first intended to fill the spaces between the relieving arches with panels of bronze or forged iron, but for the purpose of keeping the cost within desired limits it was afterwards decided to use moulded panels of concrete. The face of the main arch ring was finished in similar material, the concrete blocks being jointed like stone masonry. In places where facing blocks were not requisite the outer part of the concrete was of a quality suitable for receiving a fine finish. The balustrade is also of concrete, relieved with bronze lamp-posts and figures on pedestals at the portals.

Southwark Bridge.

BY a recent census of the four bridges across the Thames, within the jurisdiction of the City Corporation, it is proved that Southwark Bridge is very little used. This fact was already well-known to everyone who has had occasion to make regular use of the bridge, the reason being the severity of the approach gradients, particularly on the nothern side of the river. The suggestion was subsequently made by the Corporation to the Bridge House Estates Committee, that a viaduct should be constructed from a point in Queen-street, over Upper Thames-street, to the commencement of the bridge, and it was further suggested that inquiry should be made as to the practicability of removing the cast-iron semi-circular arches of the bridge, with the view of replacing them by low-crowned elliptic arches. These matters were referred to the City Surveyor and the consulting engineer, with the result that the following propositions were made:—(1) To lower the summit of the existing bridge by some seven or eight feet, and to raise the levels of Upper Thames-street and Queen-street some three feet, with a proportionate elevation of some minor streets leading therefrom; and (2) to lower the present bridge, and to construct a viaduct across Upper Thames-street. The former of these projects was approved by the committee at an estimated cost of 350,000l. It is stated that the adoption of the scheme will alter the gradient at the northern approach from 1 in 20 to 1 in 50, and at the southern approach from 1 to 23 to about 1 in 40—certainly a great improvement. The actual extent of the lowering will depend upon the requirements of the Thames Conservancy, but as the structure now gives a headway of nearly 4 ft. more than the railway bridge at Cannon-street, it is tolerably certain that a certain amount of reduction will be permitted. The new gradients will compare very favourably with those at Blackfriars Bridge, which are 1 in 40. As the scheme involves the practical reconstruction of the bridge, with the exception of the shore abutments, it will be interesting to hear something more as to the architectural treatment of the new structure. This is a matter to which we shall give attention when the decision of the Thames Conservancy has been communicated to the Corporation.

Euston Station.

IT is satisfactory to be able to note that the entrance, as it may be called, to Euston Station, that is to say, the line outside the station, has now been considerably enlarged. This will facilitate dealing with the incoming and outgoing traffic. It is to be hoped, however, that the Board of the North-Western line are pushing forward their scheme of an enlargement of the station itself. This, which at one time was regarded as the ideal railway station of London, is now rapidly becoming the worst. Nothing can be more inconvenient than the widely separated West and East departure platforms, and the want of communication between the different parts of the station. Those who are acquainted with the convenient simplicity and spaciousness of the central stations at Cologne and at Frankfort must feel some surprise that the board of the chief English railway has been so long in the rebuilding of Euston Station.

Fetter-lane and the Black Swan Distillery.

NEW premises have just been completed after designs by Messrs. Treadwell and Martin for Messrs. James Buchanan and Co., at the northern end, west side, of Fetter-lane. The new buildings have replaced a portion of the old Black Swan distillery, formerly occupied by Messrs. Anderson and Co., gin distillers, who adopted the sign of the Black Swan for their distillery works at Nos. 25—6, Holborn, many years ago, to commemorate the circumstance that the distillery had been established there early in the eighteenth century on the site of a hostelry by that same sign. On Wednesday, June 7, 1780, the "No Popery" rioters, together with the prisoners they had liberated from Newgate, sacked and burned the two houses in Holborn, at that time tenanted by Langdale and his son, a firm of distillers, ostensibly because of their religious tenets. On that occasion the adjoining Barnard's Inn narrowly escaped from the flames. A graphic description of the attack upon Langdale's is given in "Barnaby Rudge." The two freehold houses in Holborn were re-built in 1897, after Messrs. Treadwell and Martin's plans and designs for Messrs. James Buchanan and Co.

The Old Gaiety Theatre and its Site.

ADVERTING to Mr. Hudson's letter in our last week's number (p. 250 *ante*), we may say that Mr. E. Bassett Keeling was but twenty-six years old when he adopted for the Strand Music Hall a style which, whilst forming a novel and original departure at the time, has not been without its

influence since. We believe that C. J. Phipps, who designed the restaurant too, somewhat modified the façade when he converted the hall as the Gaiety Theatre, which was opened on December 21, 1868. Having been leased by Mr. John Hollingshead in 1876, the theatre was afterwards enlarged at the side, and at the rear by the inclusion of the offices in Wellington-street, still distinguishable by a wide and curved bay, of the *Army and Navy Gazette*, and previously of *Household Words* in Charles Dickens' day. For the Strand Music Hall was demolished the New Exeter Change, or Wellington Arcade, leading out of Wellington-street into Catherine-street, which was built for the Marquis of Exeter in 1843–3, after designs by Sydney Smirke, R.A., the elder; the passage, 60 ft. by 12 ft. and 20 ft. high, had three middle rectangular bays with skylights, and polygonal vestibules with ceilings at the ends—the latter skilfully masked the obliquity of its direction. The second Marquis of Exeter directed by his will that all his London property, including the New Exeter Exchange, Exeter-street, and the vicinity, should be sold to pay his debts incurred on the turf. During the demolition now in progress has been found a picture, painted, it is said, in 1868, by Mr. Stacy Marks, R.A., and representing a group of merry-makers, for a space above the arch of the proscenium.

MAGAZINES AND REVIEWS.

THE *Art Journal* contains personal recollections of Whistler, by Mr. Croal Thomson, who would have us believe that everyone who did not admire Whistler as much as he admired himself was merely stupid, and merited the sarcasms of the artist. There are, however, people who are as much enthusiasts for art as Whistler himself, and as little Philistines, who do not think him as great an artist as his clique of admirers declare him to be; and it may be a question whether Whistler himself was not a Philistine in other directions, as when he declared (*teste* Mr. Thomson) that there was nothing admirable in London except the way the police directed the traffic. A stupid thing to say, if he meant it; but he very likely did not mean it, and would have contradicted some one else who had said so. As to the "Symphonies," Mr. Thomson is quite right in implying that the use of a musical term for a study in colour was quite legitimate, and no one need have taken exception to it once in a way; but a great many of these "symphonies" sank into mere unmeaning tricks of effect, and we doubt if the painter believed in them himself. Personal recollections of so very personal an artist are, of course, sure to be interesting. When, however, we are told that Whistler will in time be reckoned with Titian as a figure painter, we can only say that people must be a little out of their minds about him. Fifty years hence those who unearth this kind of judgment out of art periodicals of to-day will laugh at it. Lady Victoria Manners writes an article on "The Rutland Tombs in Bottesford Church," a very noteworthy collection, among which that to William Lord de Ros (1393-1414) is a perfect model of decorative treatment of the side of the tomb—angels in low relief in panels, separated by narrower panels left blank; nothing could be more suitable or more refined in the details. "Some Recent Decorations by Mr. W. Reynolds-Stephens"—portions of rooms showing decorative schemes—have a great deal of originality, but show a little too much the effort to be original; and the flower friezes are far too realistic in detail to take their place in a scheme. Mr. G. F. Laking concludes his valuable illustrated articles on the armour of the Wallace Collection. Beautifully decorated as are the ancient firearms, they lack the beauty of fitness for their work. A modern breech-loading field-piece has an art in its finish and fitness which puts it above the clumsy-looking over-ornamented Venetian cannon illustrated on p. 263.

The *Magazine of Art* devotes an article, with illustrations, to the etchings of Mr. Frank Short, an etcher who can be praised without reservations. The article, by a member of the Society of Painter-Etchers, contains a good deal of technical information on processes, useful, if not to etchers themselves, at any rate to those who wish to rightly understand the objects and capabilities of the art. Mr. Hamilton Jackson contributes the first of a series of articles on "Electric Light Fittings of To-day;" dealing with "Foreign Fanciful Designs"—rather too fanciful, some of them. As the writer remarks at the close, many fittings have been made in England which are excellent from the point of view of design, "and also conform to the requirements of utility and the proper use of material." The foreign designs illustrated here seem contrived to look like anything rather than a light-holder, and to give you a kind of surprise when you find out what the thing is meant for. The *résumé* of Mr. Gilbert's Royal Academy lectures on sculpture, compressed as it is, is full of brilliant artistic suggestion. Was he correct, by the way, in saying that the key-pattern had its origin in ancient Persia? The key-pattern is found, in a more or less crude form, in ancient art all over the world, even among savages; the Greeks perfected it, but it seems more or less inherent in the minds of all races when they begin to decorate. Mr. Spielmann in this number gives "A General Survey" of the subject of art forgeries. One is not surprised to learn that "drawings by Old Masters" is one of the most successful lines of forgery. They are not as expensive to make as forgeries of jewellery and metal-work, and "the ability to forge drawings good enough to be passed off upon the general public is not uncommon." The procuring a paper which may pass for a contemporary product is the chief difficulty. The taste (a somewhat perverted one) for Rowlandson caricatures has led, it is said, to an extensive fabrication of these. Coloured prints professing to be old are in general to be regarded with great caution. "Stump work" and "Tempera" are the subjects of two articles; and Mr. Reginald Barrett writes on "Venice as a Painting Ground"—one of which he has made such good use. His reason in favour of rebuilding the Campanile is an odd one: "From the nature of the design and materials, and the absence of any individual sculpture or detail, it is quite possible to make an absolute replica." Is it any the better for that?

The *Architectural Record* (New York) contains a short article on "The Building of a Parisian House," written by a master mason who has worked on it. The article, which is of some interest, is really more concerned with the arrangement and conditions under which the Paris artisans work than with any detailed description of the building. The house, a five-story one at Passy, was carried out very quickly by a very moderate staff of men, with apparently a very systematic division of labour. There were six "compagnons," or journeyman masons; ten "garçons" (assistant masons); two to four "tailleurs de pierre" (carvers), and four men whose sole occupation was raising and placing the blocks of stone in position.

"Certain labour-saving appliances contribute to the speed with which a mere handful of men can construct a large house, as, for example, the winch with which we raise stones and mortar. I understand that English builders use for this purpose a kind of wooden tray on the top of a pole, which they bear on their shoulders, but such a primitive tool would never do in the case of six and seven story houses. So we use a winch which simultaneously winds and unwinds a long cord, one end of which is ascending while the other is descending. In many cases it is worked by electricty, but even when used by hand, as it was in our case, it enables a couple of workmen to do the work of a dozen hod men."

"Grandview," a house at Pittsburgh designed by Mr. J. E. Keirn, is a kind of return to the English eighteenth century ideal of a very plain square house with little architectural interest externally, but treated internally with great decorative elaboration; more remarkable in this case for richness than artistic feeling. Mr. Cervin's article on "The Spanish-Mexican Missions of the United States" affords, in its illustrations, interesting examples of the transference of the characteristics of Spanish Renaissance to Mexican soil, but with a difference. An article by M. Pierre Calmettes on "The Modern Style in Jewellery" (French jewellery of course; a French writer does not recognise the existence of any other!) is accompanied by illustrations which show determined "cleverness" rather than good taste.

The *Berliner Architekturwelt* illustrates no very important piece of architecture this month; the leading subject is the "Landhaus Scherl" in Grünewald, a good-sized country-house the exterior of which does not much interest us, but some of the interiors are good. It is by a Munich architect, Herr Seidl. A series of studies of arrangement and decoration of rooms, apparently from an exhibition by the "Neue Gruppe Berlin" (a kind of art society, we presume), have a great deal of interest, and, in spite of the "Neue," are fortunately free from the eccentricities and sinuosities of "L'Art Nouveau."

The *Burlington Magazine* (August 15) contains an article by Mr. Pennell (to be continued) on a rather new subject—the importance of collecting later nineteenth century book illustrations, which include much work of the highest interest of its kind. Mr. Pennell complains that collectors of book illustrations confine themselves to the work of older periods, neglecting those of their own day or the generation just preceding, which are well worth collecting and preserving while they can be easily had, and which may be unattainable hereafter. We entirely agree with the protest, and hope it may have some effect. The fourth of a series of articles on "Oriental Carpets" will interest many of our readers. The numerous illustrations included in the number are of the highest class, and in themselves give it a value. It would be more convenient if the list of articles on the cover were placed in the same order as that in which the articles occur; it seems rather careless not to attend to this.

Public Works goes on admirably, and seems to be a publication full of what may be called, in a time-honoured phrase, "useful knowledge." It concerns itself in the main with facts, not with opinions. Among the most interesting articles to our readers are one on the new building regulations of Paris, by M. Paul Strauss, Member of the French Senate; and one on a system for the photographic measurement of buildings, or the laying-down of the plan of a building (exterior lines) from photographs. This implies, of course, the knowledge of the measured distance between the building and the lens. The article is by Mr. H. Bridges Lee. Other articles are on "The Public Fountains of Brussels," and the mechanical means of supplying them with water; on "Pioneers of London Street Reform"—namely, Inigo Jones and Wren—by Mr. Rotherby; and on "The Regulating Works of the Mississippi System," by Mr. Steece, the city engineer of Burlington, Iowa.

In the *Antiquary* is an account, by the Rev. E. Maule Cole, of personal observation and experience in the opening of tumuli on the Wolds in the East Riding of Yorkshire, during the last thirty years. Within a radius of eight or nine miles from Wetwang are some 300 tumuli. The writer's friend, Mr. J. R. Mortimer, has been chiefly concerned in the carrying out of the work, and is about to issue a book on the subject, with more than a thousand drawings. The present article is intended as a preliminary summary of the subject. The following remark as to the best method of procedure may be of use to others:—

"A word or two more on how to open a mound. Our method is to cut a square of some 16 ft. to 24 ft., according to the size of the mound, from the top in the middle, and dig a trench round each side some 2 ft. deep, gradually approaching the centre. The process is repeated over and over again till the original surface soil is reached, and so there are sections left on all sides. Then the ground is tested, and, where found disturbed, further excavated, and the size and shape of the grave is soon ascertained. Immediately on any bones being discovered, tools are discarded, and Mr. Mortimer, kneeling on flat pieces of iron plating, to prevent destruction of any pottery, works away with a pocket knife, so that even a pin or a button could not escape notice."

In the *Fortnightly Review* Dr. Wallace answers his critics in regard to his former article on "Man's Place in the Universe," but his argument nearly all turns on what may be considered a side issue—whether the universe of stars is finite or infinite. Even

under the former supposition, its scale is so vast, compared with the solar system, that the question of the probability or improbability of this earth being the only orb inhabited by intelligent beings is hardly affected by it. Dr. Wallace, in his summing up, makes the same curious lapse of logic which many men of science make. He says that such delicate adjustments and such numerous combinations of physical and chemical conditions are required for the development and maintenance of life as to render it improbable that they should all be found again in any planet. Certainly the combinations that man requires will not be, and it is quite certain that no inhabitant of this planet could exist if transferred to any other planet of our system. But does it never occur to those who reason thus that there may be intelligent mind acting through quite a different corporeal mechanism from our own? They talk as if man and animals, as we know them, were the only possible mechanical agents of life and thought. Surely there is no need to assume that. However, Dr. Wallace has at least raised reflections on a great and absorbing subject.

Knowledge contains No. 4 of Miss Clerke's remarkable series of articles under the general heading "Modern Cosmogonies," this one being on the subject of "Tidal Friction as an Agent in Cosmogony." The recognition of the importance of this agent is only of comparatively recent date. It will be seen from the article that our own satellite has exercised a tidal friction on her primary, in earlier stages of their history, which is quite exceptional in the solar system. The larger the satellite in proportion to the primary, the greater, of course, is the tidal action, and as it is now believed that the moon originally revolved almost in contact with the earth, her influence on the mechanism of the latter must have been enormous. No other planet has a satellite of anything like the same proportionate mass. The subject is reviewed in reference also to the sun and other stars—double stars especially—between which this influence of tidal friction must be very marked. Learned as Miss Clerke's article is, we are obviously only on the threshold of the subject; but in astronomy (as astronomers would probably agree) we are always on the threshold.

In the *Cornhill* is a short concentrated article, full of information and scientific reasoning, on the strange and puzzling phenomena of "New Stars"—*Novæ* as they are called in astronomical language, by Mr. F. W. Dyson, F.R.S. Wonderful are the problems of fact and observation connected with this subject. From a process of reasoning described in the article, it was assumed that Nova Persei was so distant that its light took 300 hundred years to reach us. If so, it was calculated that at the time of its greatest brilliancy it gave out 8,000 times the light of the sun. The tremendous explosion of light and heat which rendered it recently visible took place, therefore, in the reign of James I. or somewhere about that time. Yet was its spectrum analysed; and more, even the spectrum of a nebula which seemed to have formed around or behind it. The theory of collision between two vast bodies or groups of matter, which has been suggested as the origin of *Novæ*, is discredited. "More plausible is the hypothesis that the star, in its movement through space, entered a region filled with faint, possibly invisible, nebulous matter, and flared up, like a meteorite in its course through the air." An article on "Rural Techniques," by Mr. G. Bourne, is interesting. It is an attempt, pretty fairly made out, to trace the form and make of various rural implements—the axe, the scythe, and others—to the influence of practical necessities of work and handling. It is rather a new subject, and well treated.

It is curious that Layard should have come to the conclusion, after some trial diggings at Niffer or Nippur, in 1851, that no important results would follow the excavation of the mounds. Mr. Valentine Geere's article in the *Monthly Review* on the work there of the University of Pennsylvania's expedition proves that he was entirely mistaken. The illustration of the inner court of the Temple of Bel shows what remarkable things were waiting for excavation. The article gives very full information as to what has been done. We may quote part of the description of a small palace of the second or third century, B.C., which is said to be the most thoroughly explored building of the site:—

"In nearly every respect this palace ranks above the other buildings of Niffer. In place of an apparently fortuitous agglomeration of ill-balanced courts and cramped chambers, with walls running in all directions and at all angles except right ones, its plan exhibits ingenious contrivance and an aiming at balance and unity; and its general detail marks at least an earnest seeking after grace and refinement, instead of a mere piling up of ponderous masses of brick-work, such as satisfied the builders of the temple and the library for instance. The architects were heavily handicapped by the hopeless material at their command—the black Mesopotamian mud; for, unlike many of the builders, they did not make extensive use of the burned bricks of earlier buildings for their walls and pavements. Possibly there were good reasons against their doing so; and it is noteworthy that in the great fortress of the same period burned bricks were sparingly used. Be the reason what it may, the walls of this palace were constructed of crude bricks, a foot square and about seven and a half inches deep; but for the thresholds, the columns of the courts, and parts of the porch burned brick was employed.

The palace was divided into two nearly equal portions, the half towards the canal being set aside for the public apartments and the use of the men, while the other side of the building (the south-west) was reserved for the women's quarters and domestic requirements. This section was further divided, the women's quarters, grouped round a courtyard in which was a broad portico, being closely shut off and accessible only through a lobby. The lobby could be reached from the main building by means of a narrow passage which might be closed by a door at either end, as was shown by the discovery of two brick door-sockets in position; or it could be entered from the servants' quarters through a second smaller lobby. The women of the household and the servants could reach their particular apartments from the main entrance through a narrow passage, without being observed from any of the principal rooms. Another room was evidently a bath. Its floor was covered with bitumen and sloped towards a drain opposite the doorway, and a skirting of burned brick, also covered with bitumen, ran round the room."

In the *Nineteenth Century* Sir Edward Brabant, the Commandant-General of the Cape Colonial Forces, writes a summary of "The Resources of South Africa." From this the inquiring reader may learn that there are many sources of mineral wealth in South Africa besides diamonds. The list includes gold, coal (extensive deposits), iron, copper, tin, lead and silver (galena), asbestos, etc. "Near Port Shepstone, on the coast of the Colony of Natal, are extensive quarries of marble stated to be of very superior quality. Before the war, a company was in course of formation to work these quarries and ship the marble to England. Now that the war is over this project will probably be revived, as a railway is now open from Port Shepstone to Durban, the port of shipment; and low freights would doubtless be charged in the absence at present of any bulky article of export to make up homeward cargoes."

In *The World's Work* will be found an illustrated description of "Building a Balloon," an unhackneyed subject in construction. A short article on "The Buried Stones of the Chilterns" gives some information as to "Denner Hill Stone," the peculiarity of which is that it is not found in strata that can be quarried in the ordinary way, but in large isolated blocks; sometimes one entirely alone, sometimes several in near neighbourhood. One stone of a hundred and twenty tons weight was found in the heart of the woods round Hampden, with no others anywhere within half a mile of it. Under the title "Exploring the Air" Mr. W. Napier Shaw gives an account of the use of kites as a means of scientific investigation.

The writer signing "Sigma," in *Blackwood*, disappoints us with a programme of "Personalia," in which we read the names, "The Pre-Raphaelite Painters"—"E. Burne Jones" (whom he deprives of the hyphen), "D. G. Rossetti," etc.; but no weighing of their artistic place is attempted—only personal anecdotes, more or less interesting, but not in all cases quite credible. The little there is of art criticism is of a very superficial order.

In *Scribner*, under "The Field of Art," Mr. Russell Sturgis suggests in outline "a possible art library," to be formed by the collection of old illustrated books. The short article shows much knowledge of books of this kind, and suggests a collection in which books should be catalogued under the name of the illustrator, not of the author.

The *Revue Générale* contains a long and sympathetic article by M. Alphonse Koesch on "Les Fouilles de Knossos." The author sums up the result, as regards art history, in the following sentence:—

"Dès maintenant, le formidable hiatus, l'immense lacune qui existaient entre le temps où fleurirent les civilisations de l'Asie et l'époque où l'on placait les débuts de l'histoire grecque n'existent plus.

Dans l'histoire de l'humanité, les Egéens, les Crétois, ont joué le rôle grandiose d'être les éducateurs, les premiers maîtres des Hellènes: iis ont été pour eux des initiateurs et des précurseurs. Knossos ne fut pas seulement un foyer de civilisation brillante et avancée, mais ce fut un centre fécond dont l'influence a été très notable et très persistante. En quittant ces lieux, en jetant un dernier regard sur ce vaste palais, sur ces objets nombreux, sur ces œuvres d'art, sur ces inscriptions mystérieuses qui n'ont pas encore livré leurs secrets, on éprouve une impression analogue à celle que l'on ressent en partant de Rome ou d'Athènes: celle de laisser après soi un des endroits où s'est formée la pensée moderne. Qui veut comprendre notre civilisation, abstraction faite des idées morales et religieuses, doit remonter à Rome et puis à Athènes; qui veut avoir l'intelligence de la M. Beck, Secretary to the Ministry of Agriculture grecque doit remonter à Knossos."

In the *Gentleman's Magazine* is an article by Mr. Giberne Sieveking on "The Decadence of the Art of Cob-Walling" in Devonshire. Now, cob-walling is building walls of earth mixed with straw, a time-honoured practice in the district referred to, but now supposed to have been driven out by brick-work; for one reason, because the cob-walling took so long to dry in winter; moreover, though one perhaps would not expect it, brick-work is cheaper. Cob-walling is a mystery in the hands of experts, of whom the author found two or three still with a practice in one small hamlet. It seems, however, to be a dying industry; nor can we doubt that the brick wall is superior in every practical respect; a lingering conservatism seems alone to cling here and there to the old method of walling.

INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

THE OPENING SITTING.

THE triennial International Congress, which at its tenth assembly in Paris in 1900 adopted Brussels as the city for the meeting of 1903, met on Wednesday, September 2.

The opening general meeting was held in the Palais des Academies, under the presidency of Prince Albert, with whom on the platform were assembled the President of the Congress, M. Beck, Secretary to the Ministry of Agriculture; M. Francotte, Minister of Works; M. Favereau, Minister of Foreign Affairs; the general secretary of the Congress; Professor Putzeys, University of Liege; a large number of representatives of foreign governments, and the principal officers of the Congress. After a brief address of welcome extended to the members of the Congress and the delegates, or whom there were over 1,900 already inscribed. M. Beck delivered an address in which he sketched the history of the crusade in favour of what has now become generally known as Public Health. The initiative was taken by the founder of the present dynasty, Leopold I., by a Congress convened in 1852, which was followed a quarter century later by the present ruler of Belgiŭm, his Majesty Leopold II. After these preliminary Congress, due to the initiative of Belgium, the Congress in its present form was instiuted at the Paris Exhibition of 1878, which was thenceforward reckoned the first of the series. The second was held at Turin two years later, and successively thereafter at Geneva, the Hague, Vienna, and again in Paris in the Exhibition year of 1889. The seventh of this series, at which, said the President, his Majesty Edward VII., then Prince of Wales, admirably explained the sanitary policy of the English Government, was held in London in 1891. The Prince of Wales then said that while serving on the Royal Commission for the improvement of the dwellings of the working classes, he had perceived the new and pressing danger to the public health caused by the rapid growh of modern industry, which was bringing in its train a superabundance of population to the towns. He then understood what enormous difficulty they would have to maintain the progress of trade in all its branches without endangering the public health, particularly in the great centres of population. The Prince

of Wales continued in his Presidential address by observing that the improvement that had been realised in the public health during the previous quarter-century was proved by the diminution in the rate of mortality and the augmentation in the average duration of life. The President, in continuing his address, referred to the different stages of progress realised at each of the previous Congresses, and the advance which they hoped to see realised in the Congress of 1903, in which there would be introduced, as a leading subject for discussion and realisation, the intervention of the governing bodies of the various countries in securing practical measures for the improvement of public health. The importance of the role of Governments in political sanitation could not be over-estimated, and for the first time it would be brought into due prominence as a subject to be considered in the sittings of the Congress.

The delegates of various governments and learned faculties were subsequently called upon by Prince Albert to address the Congress, the list including Dr. Sims Woodhead, the delegate of the British Government. After thanking the Prince and the officers of the Congress on behalf of the British members for the hospitality extended to them in that great and beautiful city, he said they all accepted with the utmost pleasure the task of discussing under the patronage and co-operation of an enlightened king, and were delighted with the honour of sharing with the promoters of the Congress the task of endeavouring to make the lives of the people better and happier. At the rising of the opening meeting the President of the Congress, Professor Dr. Putzeys, general secretary, and the principal officers of the Congress, proceeded to open an International Health Exhibition organised in connexion with the Congress, and in the afternoon the sittings of the hygiene division in seven sections were opened in various rooms of the National Palace (Palais de Parlement) were opened. Most of the sectional meetings were well attended, that of technology, in which the subjects to be discussed include sewage purification, disposal of town and trade refuse, separate and combined systems of drainage, the maintenance of public roads, ventilation and heating of dwelling-houses, and hygiene as applied to building construction, planning, aeration and decoration of interiors being inconveniently crowded in the great heat prevailing. The sittings of the Demography division are held in the Palais des Academy. His Majesty the King invited the members of the Congress to an entertainment at the Royal Palace, and reception, which commenced at nine o'clock.

A large number of the English representatives are attending the Congress, among them being Dr. Sims Woodhead, Dr. Rideal, Dr. Fowler (Manchester), Dr. W. R. Smith (President of the Royal Institute of Public Health), Dr. A. Newshilme (Brighton), Dr. John Sykes (London), Colonel Yabbicom, M.I.C.E., and other eminent engineers, and a large party of members of the Sanitary Inspectors' Association, headed by their President, Sir James Crichton Browne, M.D., and the late President, Sir Hugh Gilzean Reid.

THE SECTIONAL SITTINGS.

Section III.

Engineering and Architecture in their Relation to Sanitation.

This section began its labours on the afternoon of the opening day, September 2, in the lecture hall of the National Palace, under the presidency of Lieutenant-General Docteur, who, after a few preliminary observations, called upon the six gentlemen who had been selected to prepare reports on the first question to summarise their reports and conclusions, which had been printed and distributed to members of the Congress. The subject was "Bacteriological Methods of Purification (a) of Sewage and (b) of Trade Refuse." Five of the authors responded, their communications being summarised in the following order:—Professor Dunbar (Hamburg), Dr. Gilbert Fowler (Manchester), and Dr. Rideal (University College), whose reports were printed in English, M. Lannay, engineer (Paris), and M. Rolants, Pasteur Institute (Lille). The conclusions were as a rule either printed or translated into English, French, and German. MM. Duyck (Brussels), Montricher (Marseilles), Konticovski (St. Petersburg), and Bechmann (Paris) responded to the invitation to speak upon the several points before the meeting, and eventually the various conclusions of the reports were reduced to a common form and adopted by the section. Different views were advocated, not only as to methods, but as to the objects to be aimed at. By purification was meant by some the rendering of the water contaminated by sewage or trade waste to such a state of purity as to be fit for drinking purposes, while others thought we ought to be satisfied with its restoration to the purity of ordinary river water. The conclusions were adopted by the section in the following form:—The various biological methods of treating sewage and trade refuse for purification depend on the same general principles the application of which opens up a new and fruitful era for the purification of streams and the improvement of the health of towns; whenever engineers, sanitarians, manufacturers, or municipal authorities are called on to deal with the problem of sewage purification or that of manufacturers' refuse, they should adopt these principles, from which they might derive advantages either in employing certain methods exclusively or in combination with other methods already known or applied. It is desirable that the study of practical methods of application should be continued.

Systems of Drainage.

The second subject considered by the section was the advantage or disadvantage pertaining to various systems of drainage, called separate and combined or mixed systems, on which the following gentlemen were called upon to report:—Professor Büsing (Superior Technical School, Berlin), Dr. Cambeaux (Municipal Engineer, Nancy), Mons. Putzeys (City Engineer, Brussels), Mr. Roechling, M.I.C.E. (Leicester), and Signor Donato Spataro (School of Engineering, Rome). The report of the Italian expert not having arrived, Dr. Edwardo Wilde, Minister at Brussels of the Argentine Republic, was called upon to read a report on sanitary improvements in Buenos Ayres.

Mr. Roechling pointed out that both systems had advantages and disadvantages which must be considered in each particular case in order to arrive at a correct conclusion as to the system to be adopted in the case. The abstract discussion of either principle would lead to no practical result. As early as 1840 the necessity of the separate system was recognised in England. In the words of Edwin Chadwick, they ought to get the "rainfall to the river and the sewage to the land." This dictum eventually led to the modern systems of sewerage. Economic considerations were in most cases the deciding factors. Where the streets were kept clean by flushing the dirt into the common sewer, the separate system was out of the question. Where rain water could be turned into the rivers by means of rain water sewers without being much contaminated on the way, the separate system might be preferable. The following general conclusion was printed in English and French in the paper, and translated into German in the section: "It may appear to the uninitiated that the separate system possesses *a priori* undoubted advantages in simplicity and cost over the combined one, but it is hoped that the observations preceding will fully demonstrate that such a conclusion may prove very illusory, and that a correct judgment is only possible after, in each case, the two systems have been fully compared from all points of view, sanitary and economic." M. Charles Lucas (Paris) asked whether consideration could not be given to the problem of the disposal of refuse water from the cheap dwellings established in the suburbs of many large towns.

M. Chardon (Health Company of Levallois-Perret, near Paris) contended that no mechanical system could be universally applicable. He described the system adopted by the company of Levallois-Perret which had been in use for ten years in a community of 60,000 inhabitants. It would be classified as a separate system. The arrangements made under the system to provide for the sewerage of the line of restaurants on the north bank of the Seine during the 1900 exhibition, where there was hardly any fall, and where neither steam nor electricity could be used, were described. He had been enabled to succeed by the application of compressed air.

Mr. Wilkinson (Manchester) said the ideal system would be one that gave back to the river all the liquid contained in sewage and to the land all the solids. Of the different systems in use, one answered best in certain circumstances, and it would be a great advantage if it were authoritatively laid down in what cases the separate system and in what cases the combined system could best be adopted.

Eventually the following conclusions were formulated, and unanimously adopted by the section: The separate and the combined or mixed systems may be usefully adopted according to circumstances. It is only after a comparative study, in which the advantages and disadvantages have been carefully contrasted in each particular case and submitted to him, that the sanitary engineer can pretend to formulate his conclusions.

Water Supply.

The third subject discussed was water supply from calcareous sources. The reports were to establish the hygienic conditions found in water derived from calcareous sources. Among the reports was one by Mr. Horace B. Woodward, F.R.S., of the Geological Survey of England, and another by Mr. Allen Howe, of the Jermyn-street Museum; but neither gentleman was present, and only Mr. Woodward's report was distributed. The principal reports considered were those of Mons. Janet (Paris) and Mons. Martel, a cavern and rock specialist of Paris. Mons. Janet, in his conclusion, contended that recourse should not be had to calcareous sources of water supply so long as sandy soils could be found to furnish sufficient. Water from calcareous sources should only be admissable after careful examination, and when a rigorous supervision had been established over the gathering ground. The general conclusion of Mons. Martel was that water issuing from calcareous sources is in most cases dangerous, and always to be distrusted. Such water should not be used unless water could not be obtained from sources less exposed to the many causes of contamination, variable, permanent, or temporary, than are calcareous sources. In the course of the discussion, which occupied three long sittings, observations were made from the English point of view by Dr. Rideal and Mr. Roechling, and a communication was read from an English water expert (Mr. Kendal, Museum of Geology) in which the views of the most advanced among English sanitarians with regard to this subject were summarised. Water from limestone rocks was very hard, and always contained sulphates, to which fact boiler explosions were probably often due. Among the advantages claimed for hard water was that it was bone-producing; but there was probably but little force in the observation, since big men were often to be found in soft water districts. One disadvantage attributed to hard water was that it tended to produce dyspepsia, but the greatest of its disadvantages were of an industrial character. Hard water was difficult to use for detergent purposes, and many objected to it either for washing or drinking purposes. Many limestone rocks produced water of a high degree of purity. But there were two kinds of calcareous rocks, one porous and the other compact. In the former, impurities might get into the water from different districts, and it should therefore always be filtered. Water from porous limestone rocks was to be distrusted. In some cases holes which had existed for centuries had been to some extent used as cesspools, and not unfrequently such rocks contained paraffin and bituminous matter.

There was a general consensus of opinion that the absolute terms in which M. Martel had couched his conclusions were too sweeping, but that on account of the very variable conditions under which water from calcareous sources was found, very searching and thorough examinations with the aid of specialists should be considered indispensable.

Professor Pagliani (University of Turin) said many calcareous sources in Piedmont yielded absolutely pure water. The earth was a great biological and chemical filter, and therefore they would often get water from chalk soils which contained no chalky matter. For testing whether there was connexion between water sources apparently separated, biological tests were often more reliable than mechanical tests with colouring matters. In the growing difficulty of finding fresh sources of water supply, calcareous sources should not be rejected, but they should be carefully examined.

M. Janet contended that great and sudden

changes in either the quantity yielded or the temperature of the water obtained were unfavourable indications. He pointed out various means of improving an inferior water supply.

Dr. Struelens stated that when first he became connected with the prison of St. Gilles twelve years ago it depended entirely on well water, the cases of epidemic maladies were frequent; but since the wells had been suppressed and the water supply was exclusively from the river Bocq, not a single case of typhoid or other infectious malady had been recorded among the 600 prisoners there incarcerated.

Mr. Roechling deprecated discussion of particular cases. The qualities of water from limestone rocks varied very considerably. In some the impurities were absolutely nil. It was quite impossible to lay down any general law, but they might safely state as the general view that calcareous sources of water supply should be looked upon with suspicion until the actual conditions had been ascertained by thorough examination. Any expression of views by the congress might form the basis of legal enactments, and if they admitted sweeping statements they might destroy the chance of obtaining water from many good sources.

After the luncheon interval, M. de Kontkowski discussed the question from the point of view of the Russian engineer, and Dr. Rideal from the English point of view.

Dr. Rideal said he wished to supplement his remarks of the previous day with regard to Clarke's softening process. He had hardly made it sufficiently clear that this process had hygienic advantages as well as the industrial advantage of softening, which was the principal object of its adoption. He had examined water bacteriologically before and after the softening processes, and at first had found in hard water a great number of organic impurities, but after the softening process the same sample was practically free from bacteria. It might therefore be that as the softening process would eliminate the bacteria, they would have the great advantage of now finding in the hitherto suspected calcareous supply an additional source of hygienic water. Would it not be a great advantage if they were able at the intake to treat the water chemically for softening, and at the same time find that they had eliminated the bacteria. After some further discussion the following conclusions were formulated and unanimously adopted. (1) Water supplies from calcareous rocks ought to be the object of particular attention, because of possible defects through filterage in fissured rocks. (2) A minute examination from the double point of view, hydro-geological and chemico-biological, ought to be made before water is taken. (3) When once water has been taken, measures must be adopted providing for the protection and continuous supervision, not only of the water, but of the whole gathering ground.

Hygiene of Towns.

Saturday was devoted to the discussion of the best measures for securing healthy houses in healthy towns; methods of removing and finally treating house and town refuse. In order to bring the subject before the congress in the most effective manner possible, reports were presented by the chairman (Mr. Alfred Roechling, of Leicester) and five members of an "International Committee of Street Hygiene" specially appointed to study this question. Of one of the seventeen members of this committee who died in March, 1901, and was replaced by Herr Bohm, a Berlin magistrate, the report of the chairman says:—"It is with the greatest possible regret that the committee have to report the death of one of their members, F. Andreas Meyer, Chief Engineer of Hamburg, who was without doubt one of the leading engineers on the Continent of Europe, and a pillar of sanitary engineering." The reports are exhaustive, covering every point of the subject, and the conclusions have been published in English, German, French, Swedish, Italian, and Dutch, and Colonel F. v. Kontkowsky, the representative of Russia on the committee, has undertaken to translate them into Russian and Polish. They are far too long to be quoted, but they represent a practical ideal of a systematic and well-regulated system of cleansing streets which every local authority should be urged to adopt. Authorities are urged to take the following general principles for their guidance:—(1) Prevention is better than cure; (2) the most efficient sanitary work is the cheapest in the end; (3) local authorities should carry out their sanitary arrangements with their own staff under specially skilled superintendence; (4) all sanitary arrangements ought to be so designed that they will work regularly throughout all seasons of the year. The conclusions and rules deal (a) with the construction and maintenance of the surface of public roads and streets, (b) with their cleansing, (c) with plants and trees in public streets and places, (d) with urinals and water-closets in public places, (e) with the removal of snow, (f) with house refuse, (g) with dry refuse from factories, (h) with dry refuse from markets, (i) with refuse from slaughter-houses, and (k) with the administrative care of streets. On the last point Mr. Roechling thus concludes:—"The construction and maintenance of the surface of public streets, roads, and places, the cleansing thereof, the planting of trees, shrubs, plants, etc., in them and the care of these afterwards, the construction and maintenance of water-closets and urinals in public streets, roads, and places, the collection removal, and disposal of refuse from houses, industrial establishments, markets, slaughter-houses, etc., ought to be in the hands of one administrative official, who should be directly responsible to the authorities, and who should be a trained engineer well acquainted with hygiene."

Among the most universal of the rules are —no contractors—avoid dust by systematic watering—cleance at night or early morning —burn street sweepings—remove snow as soon as possible—burn house refuse—no refuse tips —provide (if possible in duplicate) air and water-tight bins, to be removed full and to be cleansed and disinfected every morning. In the case of each report the most valuable and interesting facts are given—of Berlin and Hamburg by Herr Bohm.

Following Mr. Roechling, the Chairman of the Streets Committee (Berlin), Herr Bohm, summarised his conclusions, the chief points referred to being the asphalted roads and the plantations of trees in public places in Berlin. Details were given of not only the collection, removal, and disposal of house and street refuse, but of the water-closets and public urinals, their maintenance and disinfection. The multiplication of seats in the streets and public places Berlin had spent large sums; in all about 50,000 chairs and 2,000 benches were provided. The rules laid down in the paper for the collection, removal, and finally disposing of house refuse and dry refuse from mills, factories, and markets were generally followed in Berlin, destruction by fire being the best method of disposal. It was proposed thus to treat even the refuse of slaughter-houses, although the compost formed of the blood had for many years been sold to agriculturists. In Berlin alone this would involve a sacrifice of a large proportion of annual income. The totals of workpeople, their wages, cost of waggons, repairs, etc., under the first head alone—keeping clean the surface of the streets and roads—cost an enormous sum annually. In Turin, Warsaw, and Berne the situation was described in the reports of Dr. Pagliani, M. Tedeschi, Dr. Polak, and Dr. Smid, who all rallied to the conclusions enunciated by the Chairman, and they had little to add.

The discussion of the conclusions was commenced by M. Leurs (Alderman for Public Works), the officer responsible to the City of Brussels for carrying out all sanitary work in conjunction with the City Engineer, and he declared that for many years the sanitary arrangements of Brussels had followed the principles recommended by the International Committee. He gave details of the way in which various departments were organised, their methods, cost, and the very extensive plant necessary, and particularly with regard to the disposal of street and house refuse, which has been the most troublesome and the most costly. They took credit to themselves that their new works (which he had the honour of showing to many members of the Congress on the previous day) for cremating all the refuse of the streets, the houses, the markets, and the slaughter-houses were not surpassed by any municipality. Twenty years ago they were able to sell a portion of the refuse to agriculturists, but through the general employment in later years of chemical manures they had been compelled to deposit it in increasing proportion on a piece of waste land, the lease of which was running out and could not be renewed. Brussels was far from the sea, and was precluded by the expense from sending the refuse to sea or to the marshes of La Campine, and the City Council was compelled to take up afresh a project for cremating it which they had failed to carry some years before on account of the opposition of the friends of the agriculturists. After visiting London, Leeds, Bradford, Huddersfield, Leicester, Hamburg, Berlin, and Vienna, they decided to follow the example of Hamburg, and put up a Horsfall Destructor plant capable of dealing with the entire refuse of the city. The works were completed a few weeks ago, and had been successfully at work for a month without costing a centime for fuel, although during the summer the refuse contained from 30 to 40 per cent. less cinder refuse than at other seasons of the year. The works were within the city itself, on the Quay de Willebroeck, not very distant from the Bourse, the Hotel de Ville, and the great railway stations, and no complaint of nuisance had been evoked. The destructor—which was of the Horsfall Standard type, with 24 cells—had been put up by the Horsfall Destructor Company, Leeds, on a scale calculated to burn 180 tons of refuse per day, but the actual duty accomplished was 200 tons per day (twenty-four hours), a result which would be greatly exceeded during the colder months. The heat generated sufficed to drive two dynamos, each of 100 h.p., which sufficed to produce all the electric light required about the establishment, to supply forced draught, work cranes, screening machinery, clinker-crushing machinery, and all the power they required, with a margin left for future developments of an additional 400 h.p., the maximum power to be ultimately developed being estimated at 600 h.p. In the course of his observations, Alderman Leurs announced the fact that the burning of coal in the three summer months had fallen to a very small proportion, even in the poorer quarters of the city. The consumption of gas for cooking purposes had increased by 40 per cent. The Alderman was in complete agreement with all the conclusions of the International Committee, and he hoped to see the principles laid down speedily and generally adopted. On the proposal of Lieut.-General Docteur, the President, the section adopted unanimously the following vote:—"The section approves the conclusions presented by the International Committee of Street Hygiene, and strongly recommends their application. The section requests the Committee to continue its labours, in view of future Congresses." The President formally thanked the Committee in the name of the section, and congratulated the members on their complete success.

Mr. Roechling said it was a delight to find that the Committee's conclusions had met with unanimous acceptance. It was not an easy task to draw up a code of regulations on so complex a subject, so as to please all the world. Certain points were left for consideration at the next Congress, and in the meantime the Committee would endeavour to obtain more complete statistics.

In the course of the proceedings a very striking and novel diagram was exhibited by one of the members of the Commission, M. Van der Perk, Chairman of the Streets Committee of Rotterdam, which cannot fail to be of great value to all future students of town hygiene. The diagram showed in 365 vertical columns, one for each day of the year, the comparative amounts of the ingredients of street refuse removed daily from the streets of Rotterdam. The different ingredients are shown by differences of colour, and the comparative amounts by the greater or less space occupied for each ingredient in the column.

Progress in Heating and Ventilation.

The fifth question before the section was "The Progress of Twenty Years in the Heating and Lighting of Dwellings." Only the report (in German) of M. Pfützner, of Dresden, was in time for distribution; another, which arrived too late was by M. Etienne Herscher-Geneste, engineer, Paris. The author of the German paper gave a summary of his report, his comments and conclusions being translated into French.

M. Heyniux (chief architect of Batiments Civils), one of the vice-presidents of the section, explained, by means of diagrams, a new temperature regulator worked from a distance, of which he proposed on an early date to give a practical demonstration at the Royal Observatory. A great mechanical simplification was claimed to have been effected by substituting rarefied air in place of compressed air in the

working of the regulator. After some observations by M. Haller, of Berlin, on the advantage of heating from a central source, the discussion was adjourned to Monday.

Mr. Adolphe Smith (London) pointed out that there existed very few buildings in Europe where an effective system of ventilation had been carried out systematically. At the Bourse of Havre various experiments had been made with more or less ill-success until recently, when they introduced the plan of extracting the foul air from below. In a few public buildings, beginning with the English Houses of Parliament, effective measures of ventilation were in force, and later instances were the Chamber of Deputies and the Sorbonne, in Paris, but in all these cases the cost had been very great. Ventilation in the houses of the poor was unknown and unattempted in England, as elsewhere. The law even recognised its inability to prescribe any method of ventilation, since it offered a premium where certain classes of houses were properly ventilated by a remission of house duty. In most houses all they could do was simply to throw open all the windows, when, except in the height of summer, the rooms would be rendered uninhabitable. Every sheet of paper on a study table would fly through the opposite window, and while such a current of air was in action the room was uninhabitable. He knew of only one room in London which was properly ventilated. This ideal chamber was in the house of Dr. Lyon. In this room were two stoves a short distance apart. Sufficient air to constantly and regularly renew that of the chamber was admitted at one side and discharged at the other without its being observed. The outer air was admitted through a chamber containing oil, which intercepted all impurities in suspension. The air passed through a sort of screen full of holes regularly graduated. This was certainly a scientifically-ventilated room, but what was the cost. To properly ventilate this one room cost over 3,000 francs—more than the full value of some small houses. But this proved that the problem could be solved, and that they had only to continue their researches and experiments to arrive at last at the desired result, which was to make possible in the small dwellings of the poor conditions which could only now be enjoyed by the very rich.

The President, after observations from the reporter and one or two other speakers, proposed the following order of the day, which was unanimously adopted:—"The section thanks the reporters for their interesting labours and their conclusions, in which engineers, architects, and those who interested themselves in the welfare of the people might find some useful information. The section also thanks the speakers who have been good enough to communicate their experiences to the section." The section then adjourned.

Hygienic Houses.

The last question for discussion before the section was then submitted to the experts appointed to report upon it to the Congress of Brussels:—"General rules of hygiene to be observed in the planning, the permanent aeration, and the interior decoration of dwellings." Only the report of M. Louis Bonnier, architect, Paris, arrived in time to be distributed to the members of the section, another report, that of Professor Mussbaum, of the Superior Technical School of Hanover, only reaching the President during the closing sitting of the section.

M. Bonnier said that at the tenth Congress, held in Paris in 1900, his regretted friend M. Henri Pucey had presented a report upon this subject which was so elaborate and complete that it might have been said to have exhausted the subject, were it not as eternal and many-sided as progress—as science itself. But the infinite diversity of cases renders it excessively difficult to lay down rules ever so little followed. Great obstacles were met with wherever one attempted to codify the rules of health. The report of which he spoke, in establishing several categories of dwellings, had often to repeat the same rules for all the categories.

There were two methods at the choice of the student of the question of these general rules: (a) He might begin by seeking for the absolute, the visionary rules indicating what ought to be, in theory, that which one would expect in an ideal city, created bodily in a temperate climate, laid out in a well-chosen direction on a sound soil, with excellent materials, with inhabitants caring for their comfort, and with an intelligent administration free from all fetters. Such a combination of conditions could rarely be met with, and it might well be thought such a code of hygienic rules would be useless. (b) He might seek for an immediate remedy for all evils—a simple and practical amelioration such as can only be found at the end of definite stages of progressive evolution, taking count of the climate, soil, materials, direction, and manners, and of administrative and all other difficulties. The second method is the method of results, but from the very fact that one must be preoccupied with the multifarious data of each local problem, it is almost impossible to make rules which are general without risk of making them too general.

During a period of twenty-five years great efforts have been made everywhere. Learned societies have been multiplied to show individuals, municipalities, and Governments the road to be followed, and it must be admitted that, if much still remains to be done, great progress has been realised. In France the Government promulgated, on February 15, 1902, a law with a fine title, "Law on Public Health," a powerful organic law, penetrating into every commune, every habitation, bringing it light and air, and being armed with powerful means of coercion. Although at the present conjuncture we are simply called upon to prescribe rules for a country of moderate climate, it is necessary to vary the prescriptions according to their application to capitals like Paris, to large towns, or to rural communities. Perhaps it might even be desirable to distinguish in the last category between the house of the peasant and the country house. It is necessary to point out that the edicts of the Minister of the Interior are themselves only models—charts upon which the chiefs of departments might inscribe definitive regulations. What might suit the climate of Nice had many chances of not being applicable to Lille. And yet we are at present concerned with only the sixtieth part of the total surface of the countries represented at this International Congress. It would seem, therefore, reasonable, if general rules applicable everywhere are to be formulated, that we should adhere to very simple principles, leaving to the authorities of each country the task of accommodating them to their personal needs.

Six great principles might be enumerated. (1) Isolate dwelling-houses from all immediate contact with the soil, either by non-conducting materials or by trenches. (2) Place dwelling-houses at a distance from any centre of decomposing organic matter, sewers, ditches, kitchens, water-closets, stables, or dunghills. (3) Ventilate dwelling-houses by currents of air coming from the exterior with reduced force and crossing the rooms. (4) Thoroughly light dwelling-houses by giving access to the direct sunlight, and for that purpose widen streets, extend courts, diminish the height of houses, and extend the superficial area of towns. (5) Employ none but sound materials, suppress all complicated and useless decorations, make thick walls, and contrive in the roofs protecting cushions of air. (6) Distribute profusely pure water to houses and to individuals. It would seem impossible to further distinguish among these principles without taking from them the desired character of generality.

One point could not be too strongly insisted upon if they were to advance by a few turns of the wheel upon the road that will lead humanity to better regions. It is indispensable that municipal authorities and governments should become interested in what might be called general architecture, the beauty of towns and picturesque views, the study of plans—logical, harmonious, and therefore practical—should emulate each other in organising competitions in the tracing of new quarters and in transforming old towns into modern ones. They should show the inhabitants, by special exhibitions, the results achieved and the end to be attained. They should, in short, give to everyone taste, self-respect, pride in his town, in his own quarter, in his own house, in his own lodging. They must render hygiene—that is, health—fashionable.

The Discussion.

The section concluded its business with a brief discussion, in which M. Bonnier, M. Anciaux, Dr. John Sykes (Medical Officer of Health, St. Pancras), M. Tobianski, and other speakers took part.

Dr. Sykes, speaking in French, said that until a comparatively recent period an English family commonly occupied a whole house, the area of towns in England being, as a rule, not restricted by walls or fortifications—a restriction which perhaps had at a much earlier period in history forced the inhabitants of French and other Continental cities to live in large houses of many floors, with many families in residence. During the last half-century a great change had taken place in the houses of the poorer English people. Small houses were everywhere disappearing, and through the continually augmenting immigration of rural populations into the towns London and other great cities were rapidly changing, and instead of the one-family house they were now building great houses with many floors or flats, as English people called the *étage*, every flat containing numerous families, each in a single room. In such houses the staircases and even the passages on each floor were common to many families, the result being generally very insanitary. Dr. Sykes cited a house in which ten families occupied ten rooms, the only means of ventilation being access to a common passage or corridor. A case of measles breaking out in one of the families, the outbreak spread rapidly, until every family had one or more cases of measles. In order to mitigate the sanitary evils arising from the overcrowding of such tenement houses, by-laws and regulations were prescribed by the authorities, which it was the duty of the medical officers to see carried out. In regard to ventilation, many of these houses were utterly defective. In a house of ten rooms occupied by ten families, the whole of the chimneys would all smoke if all the fires were lighted, because there were no systematic arrangements for ventilation. Currents of air were only too plentiful, but there was no real ventilation. In order to encourage the owners of such defective houses to comply with the sanitary regulations, a considerable reduction was made in the amount payable as house duty on obtaining a certificate from the officer of health that certain regulations had been carried out by the owner. Regulation 4 prescribes that the common staircase shall be permanently ventilated at each floor-level, or by through ventilation, so as to break the connection. Regulation 5 prescribes that each dwelling shall be arranged so as to be through-ventilated from one front to another. A current of air across the room is secured by this regulation, but it is rather perflation than ventilation. With perflation the room is not habitable, except perhaps in the height of summer. Another prescription is that there shall be at least one water-closet, properly and effectively supplied with water, for every twelve occupants or less on each floor, disconnected aerially from any dwelling in the interior of the building.

After observations from other members the President submitted the following order of the day, which was unanimously adopted: "The section, recognising the importance of the points raised in the sixth question, and declaring the interest of the communications that have been made, resolves, without coming to definite conclusions, to recommend that this question be placed on the order of the day of a future Congress.

Colonel de Kontkovski (Reval) stated that the work done by the section had been very considerable, and that it was largely owing to the manner in which the discussions had been directed by the President of the section, Lieut.-General Docteur.

The President disclaimed the credit, which belonged to the members of the section themselves, and particularly to the various secretaries, to whom the thanks of all were due.

The section was then closed.

The closing general meeting of the Congress was held on Tuesday afternoon in the Palais des Academies, M. Becq presiding, supported by the Minister of Agriculture, the Burgomaster of Brussels, M. Putzeys (the general secretary), and a number of official delegates and representatives of foreign Governments. M. Putzeys recited a long list of resolutions arrived at in the different sections, among the leading subjects being the transmissibility of tuberculosis, water-supply from calcareous rocks, the hygiene of towns, measures to be adopted to encourage the construction of cheap houses, bacterial systems of purification of refuse, ventilation and decoration of dwelling-houses, the inspection of houses for the working-classes by local administrations, hygienic inspection of schools, and inspection and disinfection of railway carriages, the provision of

INGRAM HOUSE STOCKWELL PERSPECTIVE VIEW OF DINING ROOM FROM ENTRANCE

sanatoria for cases of tuberculosis, and an international understanding from the point of view of health as to the hours of labour. A telegram was read from King Leopold stating that he had followed the discussions of the Congress with keen interest, and applauded the results arrived at.

It was resolved to accept the invitation of Germany to hold the next Congress at Berlin in 1907, M. Von Kohler, the German Government delegate, in thanking the Congress for its decision, declaring it to be the intention of the Emperor William to deliver an address at the forthcoming Congress. The foreign delegates, headed by Dr. Brouardel, severally thanked Belgium and her Government for the hospitality extended to them, and their gratification at the important results attained.

Illustrations.

MUSIC ROOM, HATCHLANDS.

THE music room at Hatchlands, near Guildford, has been built for Lord Rendel from the designs of Mr. Reginald Blomfield.

It consists of an oblong room 37 ft. 6 in. by 24 ft., with four Ionic columns supporting a dome, the diameter of which is the full width of the room (24 ft.). Over the centre is a lantern cupola. The heighth from floor to top of cupola is 33 ft 6 in. At the end of the room there is a recess for an organ, to be supplied by Messrs. Walker and Sons.

The interior is finished in white panelling, mahogany doors and enriched plaster ceiling and dome, executed by Messrs. G. Jackson and Sons.

The exterior has been built in red brick, Portland stone, and gauged brick, with Westmorland slates.

The external carving and stone urns have been executed by Mr. Aumonier. The general contractors for the works are Messrs. King and Co., of Abinger Hammer.

INGRAM HOUSE, STOCKWELL.

THE drawings illustrate the scheme for residential clubs promoted by a company formed for the purpose of erecting such clubs.

The accommodation shown in the plans is for 270 residents, with a female staff of 25 servants. The residents are distributed in five floors of 54 bedrooms on each floor, all the rooms being 7 ft. by 10 ft., excepting the 40 angle rooms of a larger size. The staff bedrooms are on the lower ground floor, and in a mezzanine over the same in one of the wings of the building. The provision of a fireplace with a flue for all bedrooms, proposed to be fitted with a small gas fire with a penny-in-the-slot meter, was one of the features of the scheme, which, with the need for large windows for the two lower floors of club rooms, suggested the constructional scheme of piers connected in large arches, with a framework filling of wooden sashes.

The club rooms are of large size, and on the principal floor form a suite of a certain uniformity of treatment, suitable for occasional receptions on a large scale.

The general distribution of the plan, while obviating any courtyard rooms, also meets the difficulties of light and air encountered on three sides of the site, which is an old orchard at the rear of No. 42, Stockwell-road, extending also behind Nos. 40 to 46 in that road.

The entrance will be by a private road through the former stables of No. 42, and the existing house will be used as the residence for the managing head.

The articles of association of the company provide that in making regulations for the management of any of the residences under the control of the company the directors shall not impose any religious test as a condition of admission or of residence.

The site at Stockwell is close to the station of the City and South London Railway, which provides quick communication with the City, and is also close to many lines of trams and omnibuses giving access to all parts. There is also the advantage that it lies between the Brixton and Clapham roads, enabling anyone with a bicycle to reach within a short time all the commons and the cricket and football grounds on the Southern side of London.

The club rooms—carrying out the social idea of the scheme—include a lecture-hall, available for concerts and entertainments, to be fitted also as gymnasium, and conforming to the requirements of a public hall; a library, a smoking room, two billiard rooms (each of three tables), and a dining-hall capable of seating 200 at one time.

A feature of the plans is the ample bath-room accommodation up stairs and down, and the large lavatory building, arranged in duplicate, on the lower ground-floor level.

The balcony at the fifth-floor level, 63 ft. above the street, provides a means of escape in case of fire, circulating round the building, and connecting the two bedroom staircases. There is also a panic fire escape staircase of iron in the centre block, leading down on to the large flat over the dining-room bay, and thence by a short turret stair to a flat 7 ft. 6 in. above the street.

The architect to the company is Mr. Arthur T. Bolton, of Westminster, and the quantities for the building were taken out by Messrs. Widnell and Trollope, surveyors.

Tenders were received, as already published from a selected list of contractors, the lowest being within 500*l.* of the authorised estimate of 40,000*l.* The building in progress at the present time is being carried out by Messrs. Rudd and Son, of Grantham, on a somewhat reduced scheme for 208 residents, the top storey having been omitted, and the design modified accordingly.

QUEEN VICTORIA HIGH SCHOOL FOR GIRLS, STOCKTON-ON-TEES.

THIS building is intended to accommodate 150 girls, for whom are provided six class rooms, including a kindergarten room for 30. Additional accommodation can be obtained, if necessary, by putting a class-room at each end of the east front.

The class-rooms are placed on the first floor, separated from the hall by a corridor, and facing east; on the top floor are the science rooms and studio. The building is of red brick, the upper part being covered with rough cast, the centre portion of the front being in cut brick.

BUSINESS PREMISES, HOLBORN.

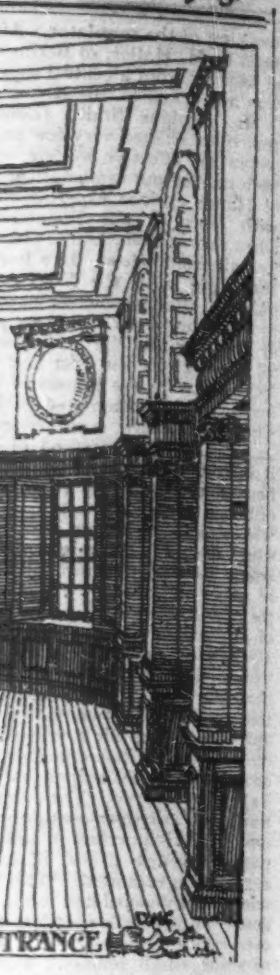
As a study for a mere front of London business premises, I have found this of unusual interest.

The ground, first, and second floors consist of large open spaces for showrooms, where the floor itself has to be left quite clear. Settees for the use of customers, recessed into bays, give this result; hence a bay-window treatment.

To carry these, steel construction is nowadays practically essential; but nevertheless the eye requires to be satisfied, which result

Sections.

PHOTO-LITHO. SPRAGUE & Co. LTD. 4 & 5. EAST HARDING STREET. FETTER LANE. E.C.



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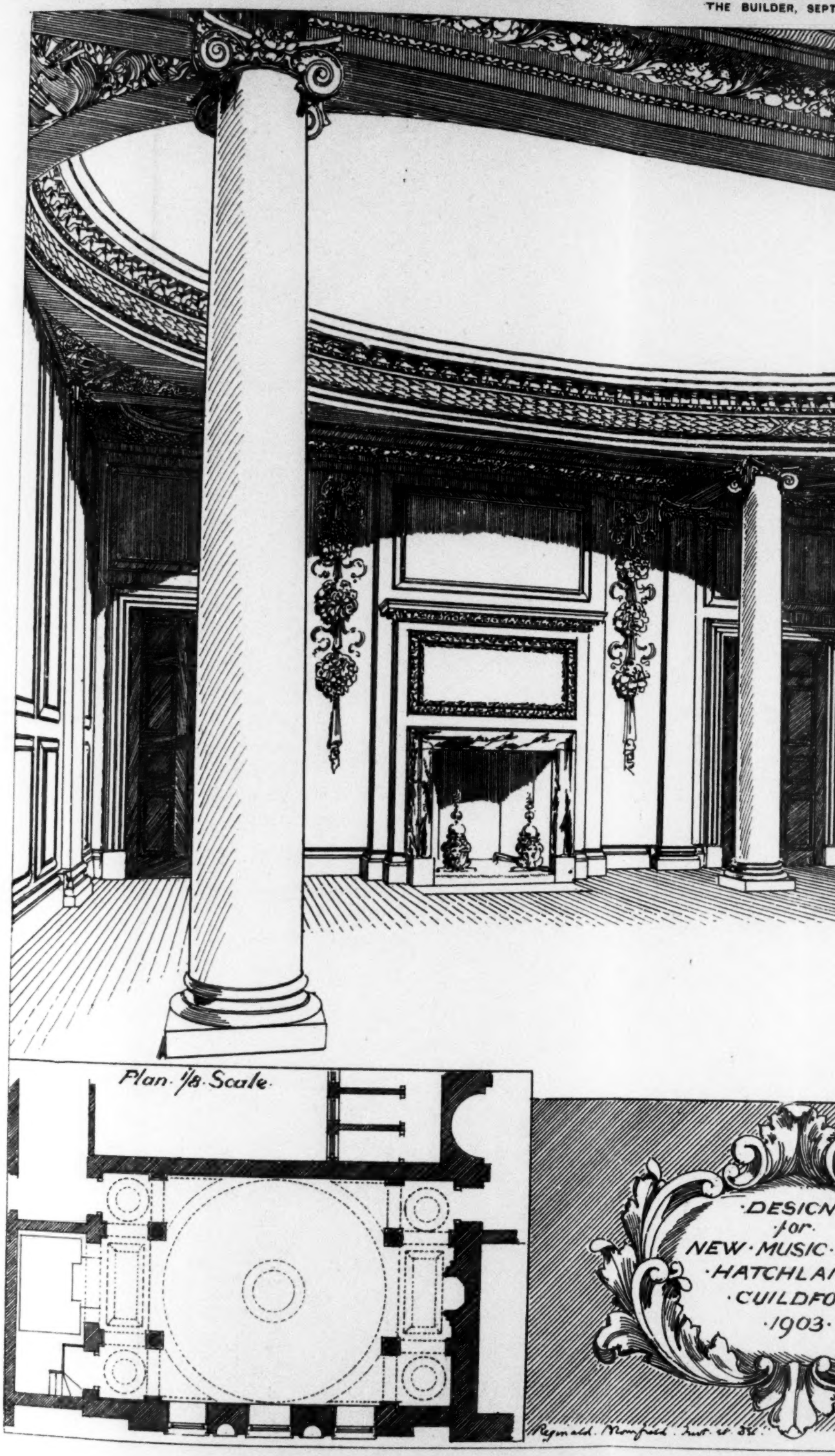

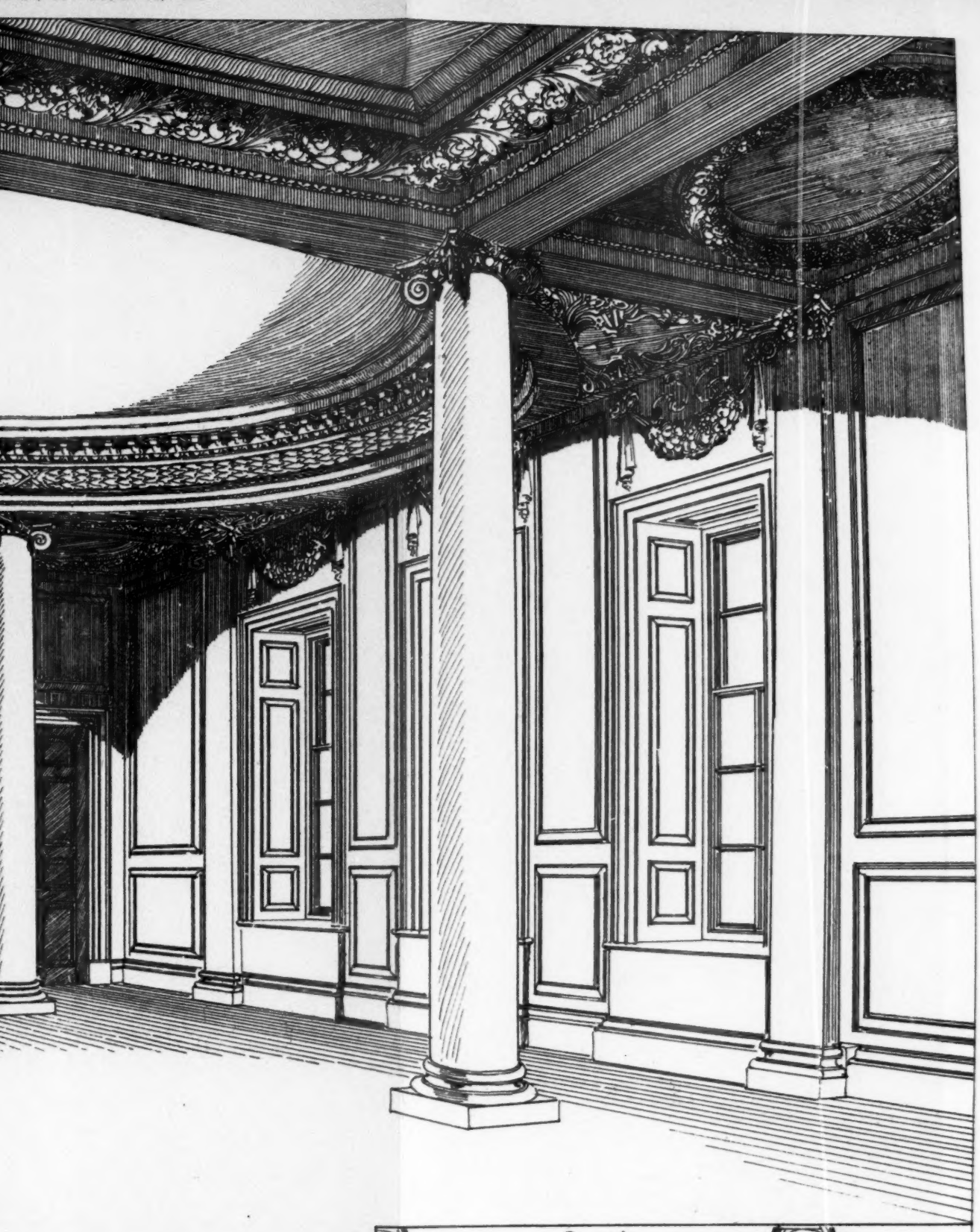

DESIGN
for
MUSIC ROOM
ATCHLANDS
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1903

Sections

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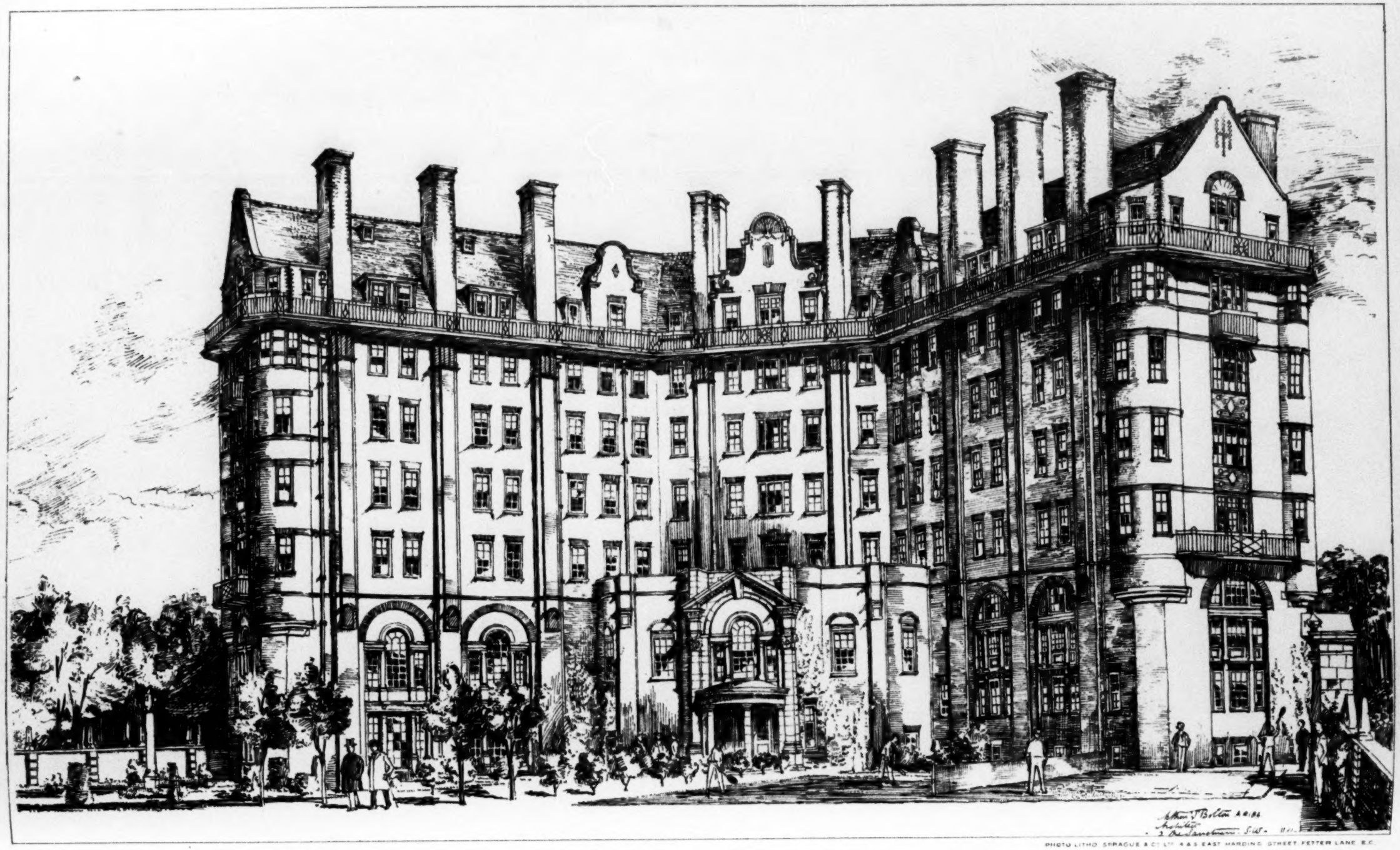

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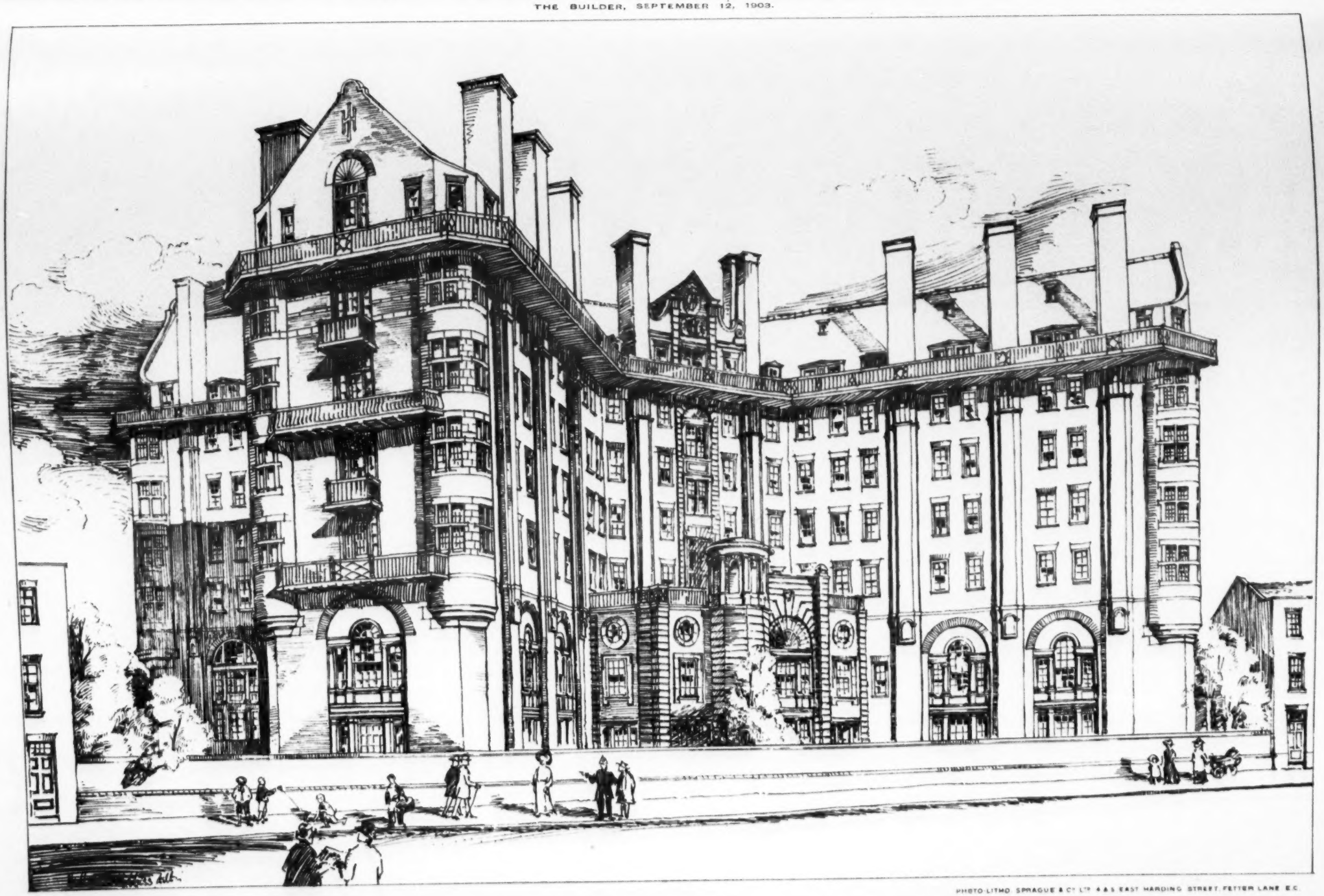
INGRAM HOUSE, STOCKWELL.—Mr. Arthur T. Bolton, A.R.I.B.A., Architect



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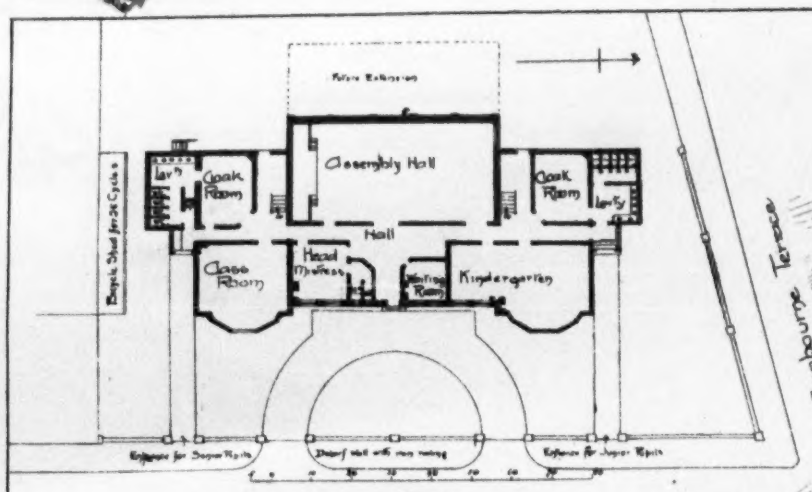

QUEEN VICTORIA HIGH SCHOOL
STOCKTON ON TEES . . .
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PHOTO LITHO. SYMONDS & CO LTD 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

BUSINESS PREMISES
HOLBORN
W. CHAS WAYMOUTH
ARCHITECT

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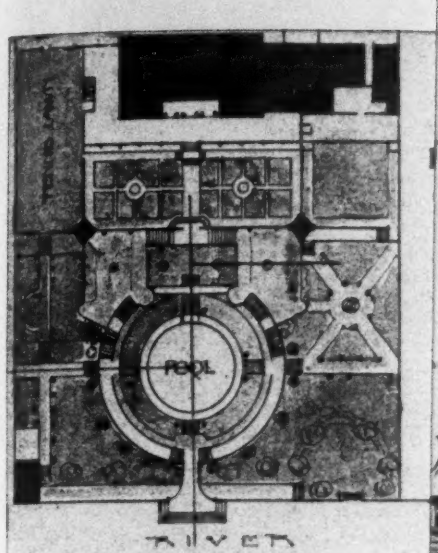

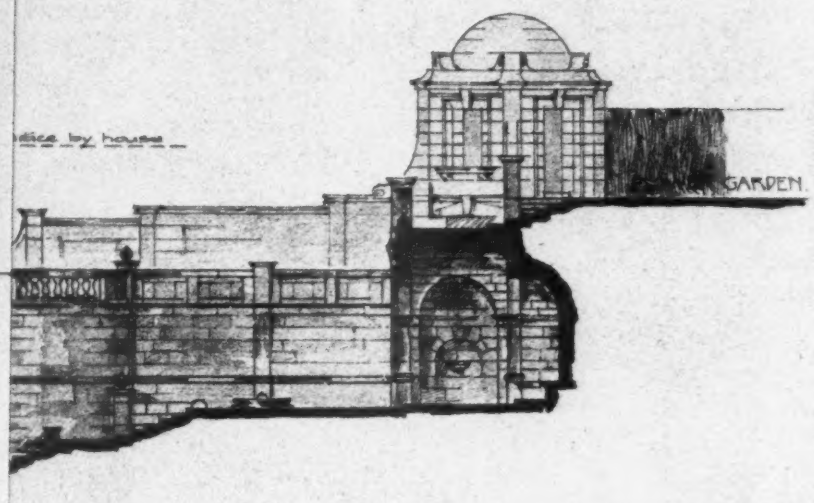

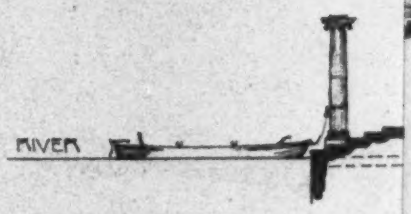

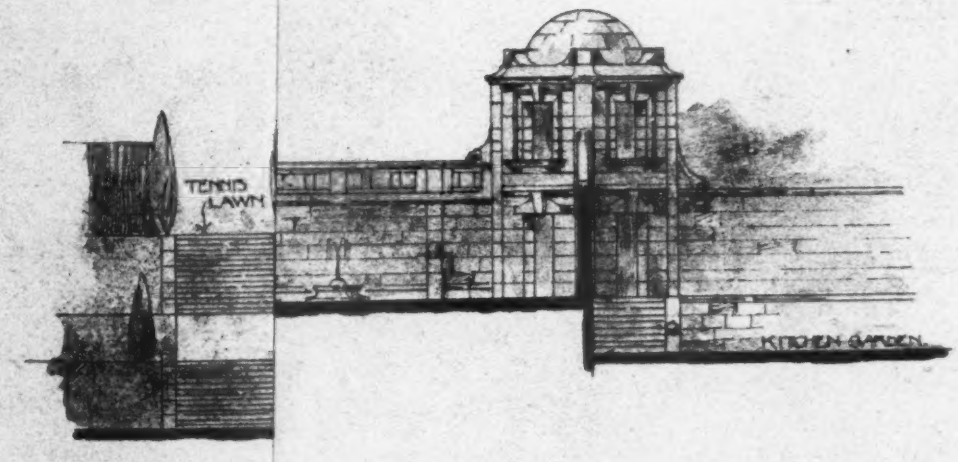

JOHN STEVENS LEE.
MARCH 1898.

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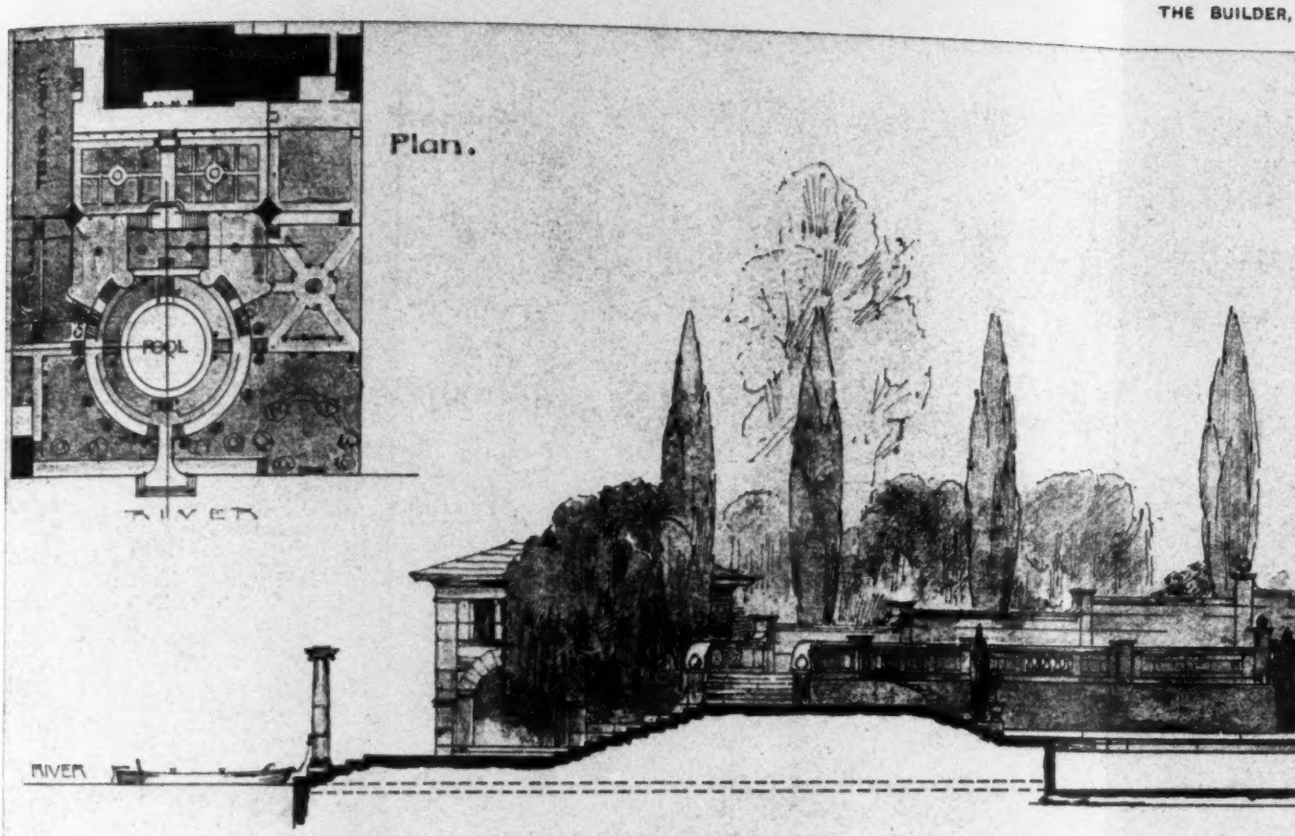

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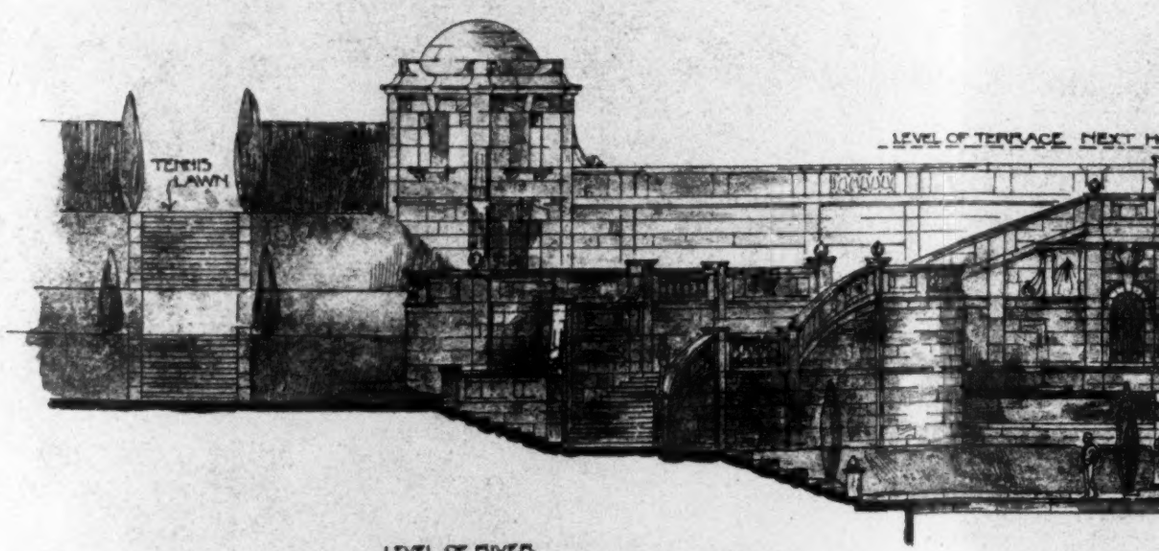
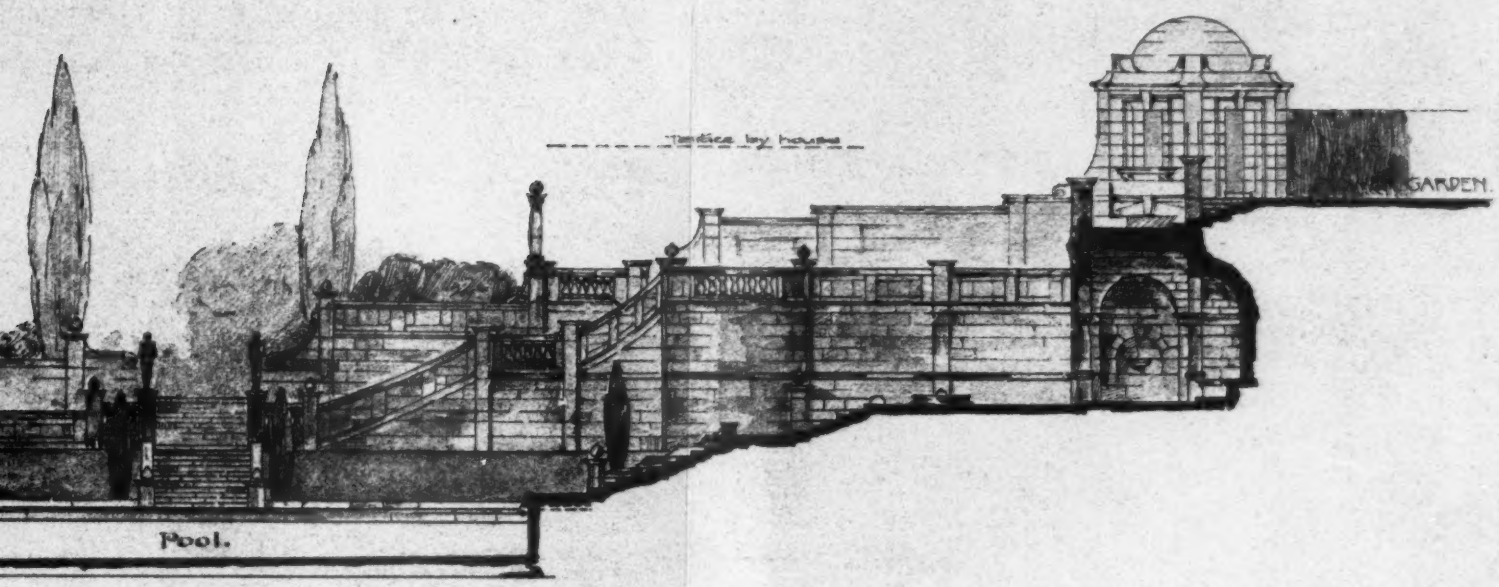


Cross

DESIGN FOR A GARDEN BY A RIVER



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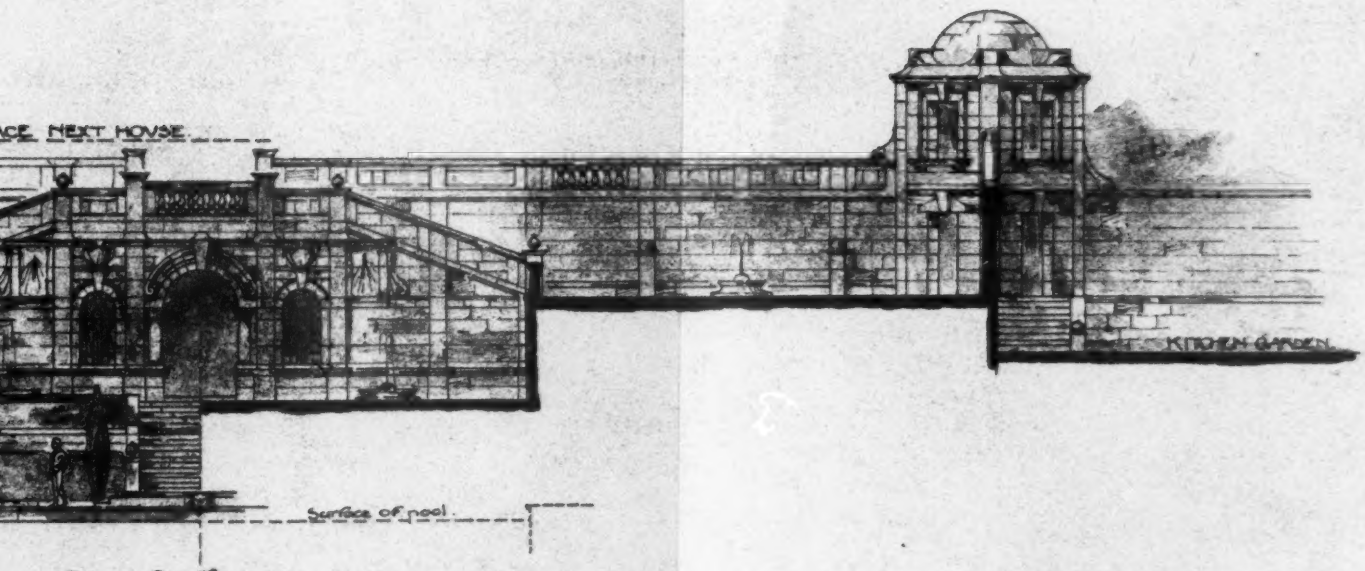

Cross Sections.

JOHN STEVENS LEE.
MARCH 1898.

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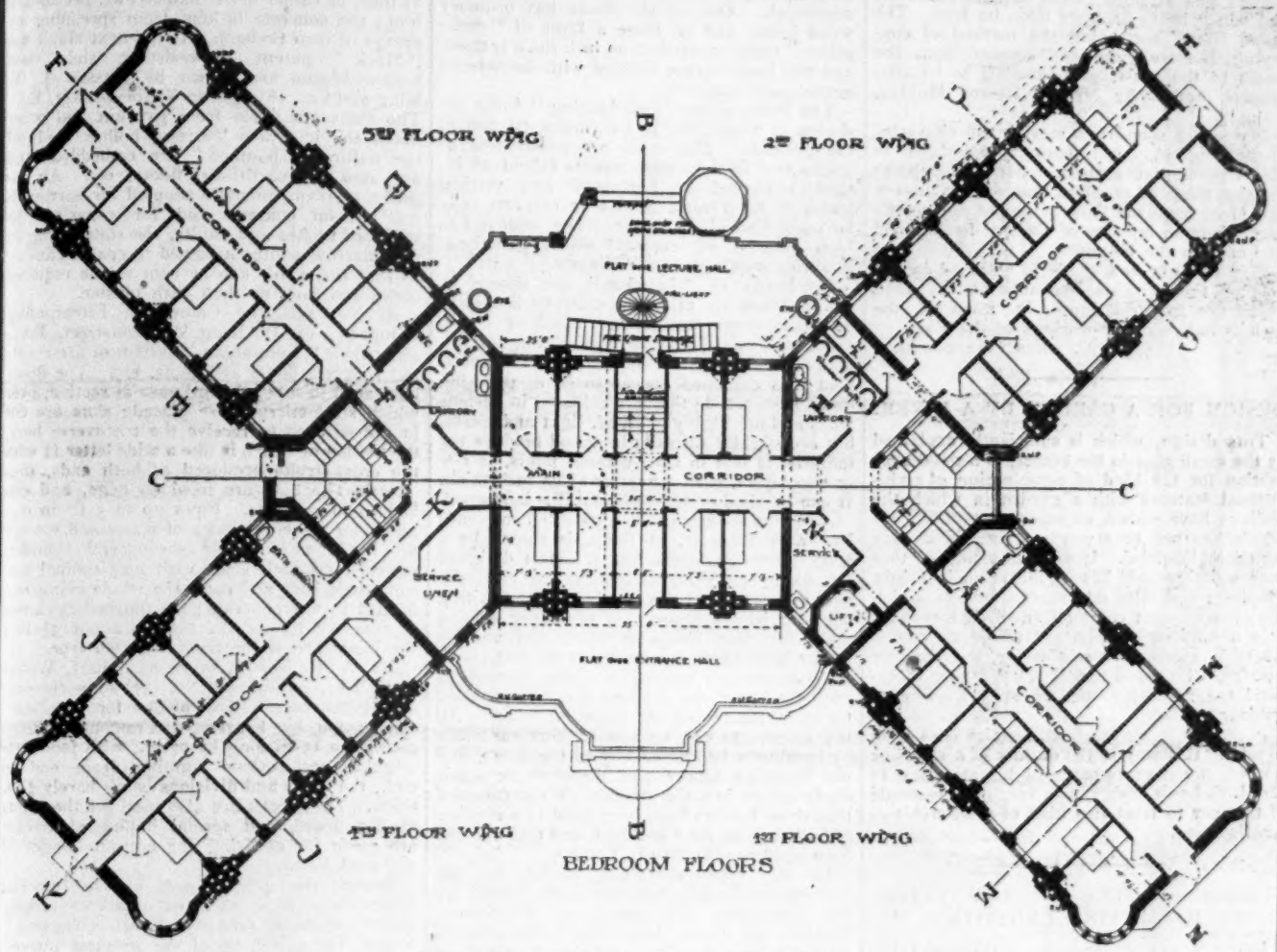
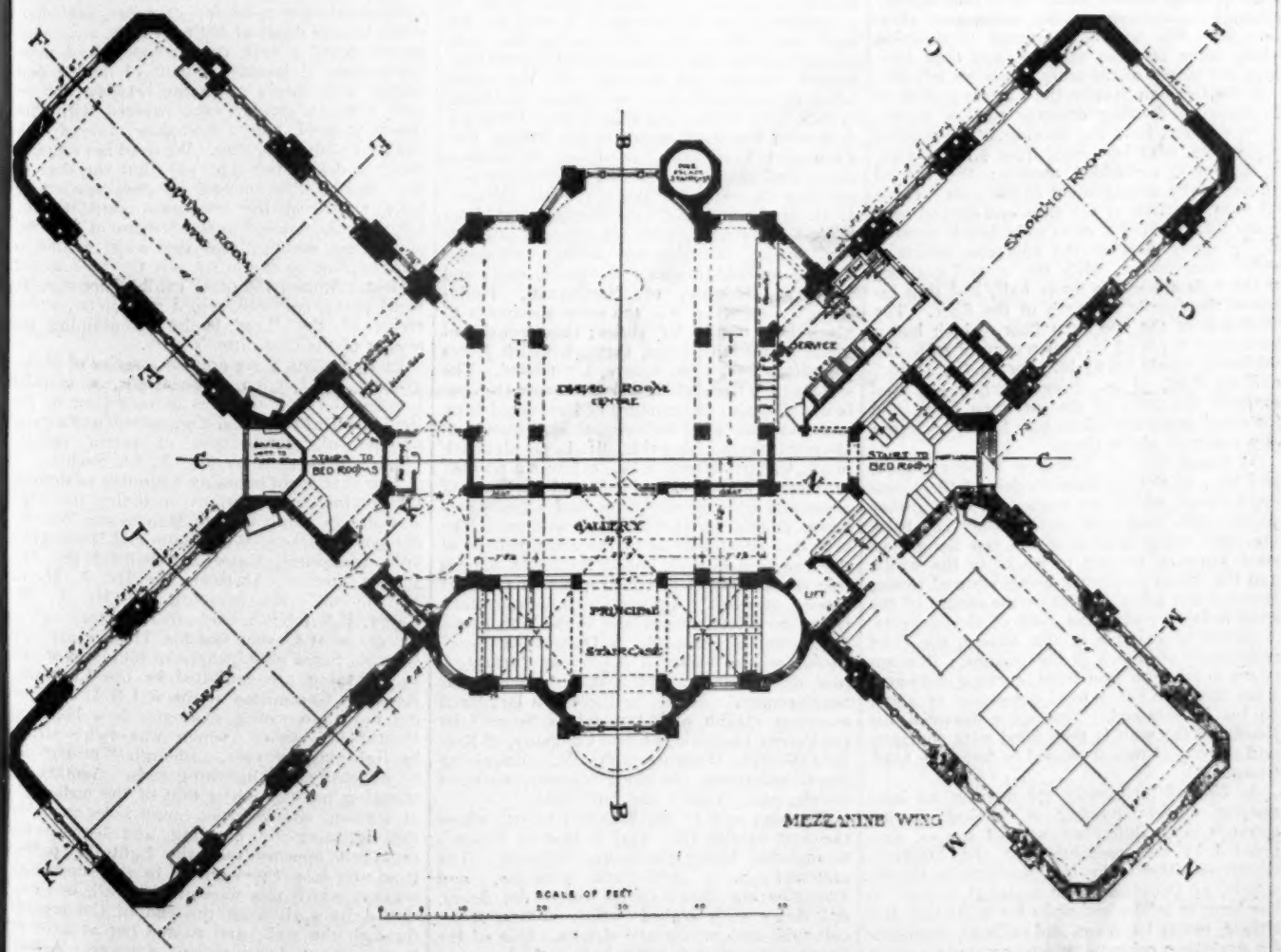


Ingram House, Stockwell. Plans of Upper Floors.



Ingram House, Stockwell. Plan of Principal Floor.

seemed best attained in the manner executed, and which bears its story upon its face. The camel frieze, portraying the method of conveying Eastern rugs and carpets from the looms to the coast, was intended to be continuous, and is by Mr. E. Roscoe Mullins, sculptor.

The wood shop-front retains the character of the original, but is entirely remodelled to give the required structural lines of support; but that these do no more than satisfy the eye is evident from the lines of arches and panelling, while an infusion of Eastern feeling will be found in the detail.

Play of light and shade is obtained by recessing the principal entrance-doors, round which are grouped figures in wood of the various native carpet-workers of the East.

W. CHAS. WAYMOUTH.

DESIGN FOR A GARDEN BY A RIVER.

THIS design, which is sufficiently explained by the small plan in the corner, is a good suggestion for the kind of combination of architectural features with a garden in which the Italians have shown so much perception, but which has not been much attempted at any period in England. It must be admitted that such a design only has its full effect in bright weather; and with our short summer—which too often does not come off at all—it is perhaps only a millionaire, who can afford to keep a riverside mansion specially for the summer months, who could find it worth while to expend the necessary sum on such a piece of outdoor scenery.

If, however, any such millionaire does wish to add in this way to the dignity of a riverside garden, we may recommend his attention to Mr. J. S. Lee's design, as a very good example of the way to treat this kind of semi-architectural garden.

FURTHER NOTES AT THE INTERNATIONAL FIRE EXHIBITION.

IN our former article on this Exhibition (May 16, 1903) we mentioned a number of exhibits which were at that time incomplete, and alluded to other stands which were unoccupied, although, according to the catalogue, they were let. We will now attempt to describe briefly some of these exhibits, and then continue our survey at the point where we left off.

In the German Section the Eggert system of fire-resisting flooring deserves further notice. In its simplest form the flooring is constructed of concrete, with iron rods, from ⅜ in. to ½ in. in diameter, embedded therein; the special feature is the arrangement of the rods. These are bent upwards at the ends and turned over in the form of hooks, so as to be firmly secured in the upper part of the concrete, which is under compression, while the central portions of the rods are in the lower half, and thus increase the tensile strength of the floor. The thickness of the specimen floor, which has a span of 30 ft., is 9¾ in.; for a span of 18 ft. the thickness would be 6¾ in.; for 12 ft., 4½ in.; and for 8 ft., 3¼ in. Special bricks are used to form the soffit of the specimen floor, and for small spans the bricks may be used without any concrete above them.

At Stand No. 17, Johannes Mueller, Marx, and Co., of Berlin, show models of their concrete floors, which are reinforced by a rather complicated meshwork of iron rods and bars, the rods being bent over the top flanges of steel joists or secured to hooks in the walls, and the whole meshwork being allowed to sag between the joists so that at the centre of the span it is very near the soffit of the concrete. A model of a stable is also shown, the chief peculiarity of which is the manger; this appears to have an iron front, curving outwards from the base till a total projection of about 20 in. is obtained. The space between the front and the wall is then filled with concrete, and the top of this is shaped to form the food-troughs.

At No. 28 (originally 27) there is an interesting model showing a vertical section through a building of several stories, fireproofed by the specialities of the Deutsch-Oesterreichishe Isolir und Korkwerke Gesellschaft, of Dresden. The material is used in the form of bricks and slabs for walls and partitions, plates for floors and ceilings, segments for enclosing columns and pipes, and in other ways, and appears to be composed of small pieces of cork embedded in cement. It is very light, and can be used in connection with woodwork. One of the floors has ordinary wood joists, and on these a layer of "cork-plates" rather more than an inch thick is fixed, and this layer is then covered with floorboards in the usual way.

The Prüss patent "self-bearing" walls are shown at Stand No. 31 (originally 35) and in the grounds. The walls are constructed of bricks laid in the compartments (about 18 in. square) formed by horizontal and vertical bands of hoop-iron. Stones or concrete may be used instead of bricks. The system has been adopted for external walls, partitions, retaining walls, garden walls, etc.

Specimens of "Lapidon" are shown at No. 36 (formerly 34). The material is said to be made from comminuted wood or stone, sand, etc., mixed with chloride of magnesium, magnesite, and other substances. The specimen tiles exhibited appear to be of the kind made from wood; they are coloured in various ways and are highly polished, light and warm, but are slightly warped; in actual practice the material is laid in situ, without joints, in one or two layers, each a quarter of an inch thick. It can be oiled or wax-polished like hardwood.

A novel fire-escape ladder, patented and made by Franz Scherrer, of Bonn, is shown by a large model at stand No. 5. It is designed for fixing to windows which are vertically over each other. Each opening is fitted with a skeleton iron casement, to the inner side of which an iron ladder is fixed, and another ladder is attached in such a manner that, when the casement is opened it slides downwards until the lower end fits into the slots provided for it in the top of the casement below. All the casements can be opened simultaneously by turning a handle on any of the floors, and the complete ladder can therefore be made ready for use in a few seconds. We understand that these ladders have been fixed to a number of buildings on the Continent, and that one has been fixed to a factory in London.

In the Queen's Palace, at No. 57, the "Shepwood" fireproof partitions, made by the Shepwood Company, of Walton-on-Thames, are shown, and at No. 62 the exhibits of the British Uralite Company, Limited, of 50, Cannon-street, E.C., are now complete. Among those which have been added since our first visit, we may mention a large model of a bungalow, in which uralite is used for the walls and roofs, and a fire-resisting door constructed of two thicknesses of deal boards with uralite between and on each side, the whole being enclosed with thin steel plates, and hung to slide with Mather and Platt's special fittings. A door of this kind, tested by the British Fire Protection Committee, is shown in another room, and affords satisfactory proof of the fire-resisting qualities of the material. Messrs. J. H. Heathman and Co., Rectory-road, Parson's Green, S.W., have a large and interesting display of telescopic ladders, telescopic folding scaffold-trestles and towers, etc.; and Mr. W. Gooding, of North-road, Holloway, N., shows at No. 130 some specimens of his safety treads for stairs; these consist of metal plates with holes, through which pieces of indiarubber, 1¼in. square, are passed. The stand of the General Electric Company (No. 79) is a well-designed structure of hammered iron, and contains a miscellaneous assortment of electric fittings. Near this, Mr. L. G. Mouchel, of 38, Victoria-street, S.W., exhibits a number of views, plans, elevations, and sections of armoured concrete buildings and other structures, chiefly on Hennebique's system. The principal peculiarity is in the arrangement of the iron or steel bars, and in the clever adaptation of the system of construction to different classes of work. Among the buildings illustrated are a large warehouse at the Manchester Docks and a grain silo at Dunston-on-Tyne; there are also views of a jetty at Purfleet, a pier at Falmouth, and a quay extension at Southampton. At No. 92 there is a large and excellent exhibit of "Impervious Stone" by the Patent Impervious Stone Company, of Rutland Wharf, Hammersmith, W., comprising steps, balustrade, moulded cornices, enriched panels, etc., in grey and buff tints.

We pass now to the Imperial Court, where the first exhibit (No. 131) is that of Stuart's Granolithic Stone Company, Millwall. The material is a well-made concrete, and examples are shown of its use in flat floors, flat floors with arched soffits, arches, steps, columns, and ornamental details. One of the floors with arched soffit has a thickness of 3 in. at the centre and 12 in. at the haunches, a span of 9 ft., and a width of 3 ft., and is loaded with paving sets weighing (it is said) 22 tons, or rather more than 16 cwt. per square foot; the concrete is kept from spreading by means of iron tie-bars. At the next stand the "Mack" patent fire-resisting slabs and hollow blocks are shown by Messrs. J. A. King and Co., 181, Queen Victoria-street, E.C. The slabs are made from gypsum and other materials, in which "strong hollow reeds of the nature of bamboo" are embedded, and are used for partitions, floors, etc. An ingenious arrangement is adopted for surrounding circular columns and for covering the soffits of arches and vaults, the slabs being in very narrow widths attached to coarse canvas, so that the whole can be bent to the required curve and then finished with plaster.

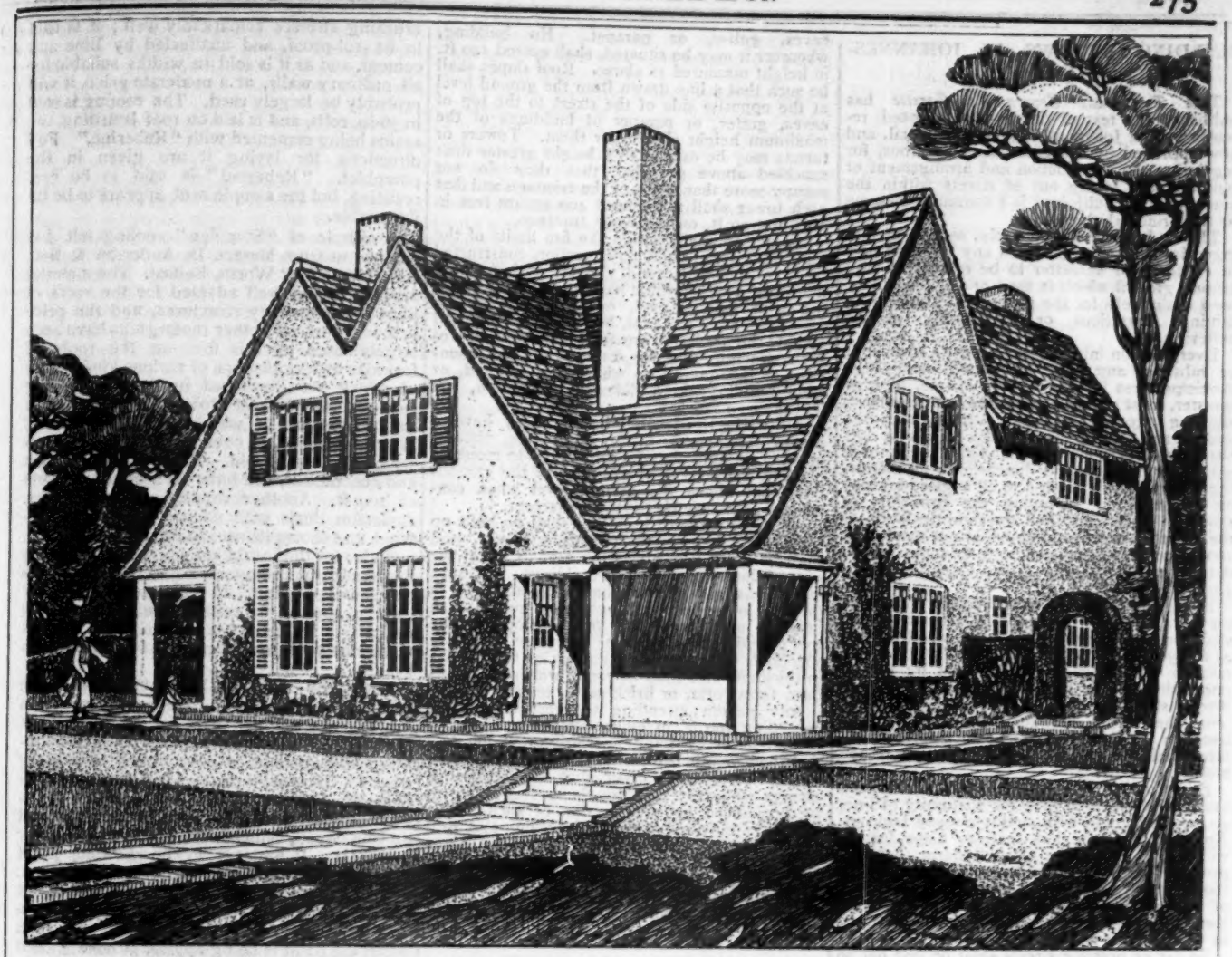
At No. 139, the Columbian Fireproofing Company, of 37, King William-street, E.C., show their "Columbian" system of fire-resisting concrete floors and roofs, etc. The floors have steel joists of the ordinary H section, over which steel stirrups are placed; slots are cut in the stirrups to receive the transverse bars, the section of which is like a wide letter H with the cross-stroke produced at both ends, thus -I—I- The bars are fixed on edge, and embedded in concrete. Pipes up to 5 ft. in diameter for the conveyance of water and sewage are made with a thin sheet-metal cylinder, stiffened on both sides with longitudinal and concentric bars and rods, the whole being embedded in fine concrete; the finished thickness of concrete for a 4-ft. tube is about 3¼ in.; the joints are of the lap or rebated type.

Mr. A. E. Brown, of Essex Wharf, Whitechapel, E., exhibits (at No. 147) some remarkable terra-cotta hollow blocks for partitions, etc., made by Frazzi, of Cremona. Some pieces are 15 ft. long by 9¾ in., with four rectangular perforations running from end to end., the walls and divisions being barely ¾ in. thick. The blocks are also used for the soffits of flat floors, and special hollow abutments are made for encasing the bottom flanges of the steel joists.

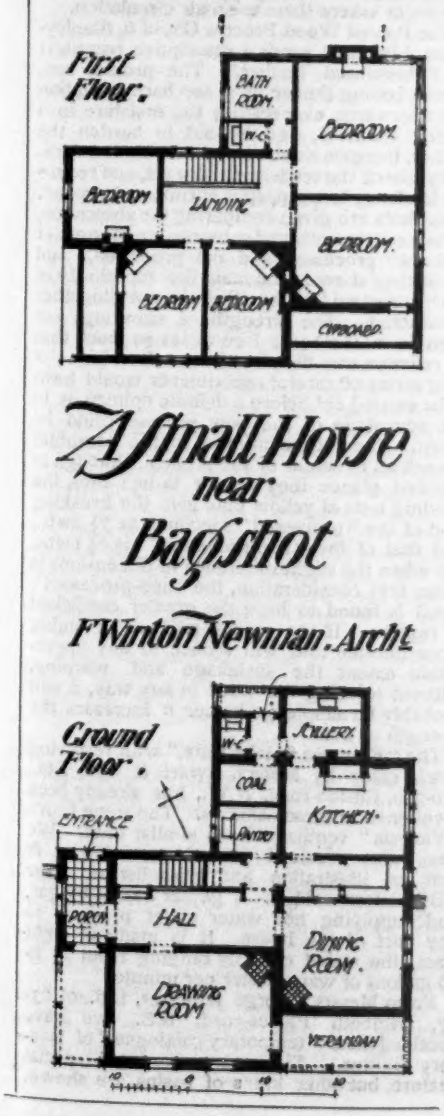
Around the greater part of the Imperial Court there is a series of rooms containing the "historical, loan, and art collection." Room No. 5 will be of the greatest interest to our readers, as it contains the remains of building materials and fittings tested by the British Fire Prevention Committee. There is a representative collection of doors, including wrought-iron doors of ordinary type, a panelled Jarrah door, a teak door composed of three thicknesses of boards, a door of double deal boards with sheets of uralite between and on both sides, a similar door covered with thin sheets of steel, and a deal door covered with steel but without uralite. We need not describe these in detail, but may say that the door of deal and uralite encased in steel appears to have withstood the test most satisfactorily. On the side exposed to the fire one of the steel plates has sprung, and the wood behind is charred, but on the other side the door is still perfect. Among the other exhibits are massive wood posts, concrete, wired glass, etc., and a series of the "red books" containing the results of the committee's tests.

In Room No. 7 we noticed a series of photographs of London fire-stations, a map of London showing the fires in 1902 (lent by the British Fire Prevention Committee) and a great number of photographs of recent notable London fires (lent by Mr. E. O. Sachs).

The next room contains a number of designs for provincial fire-stations, including the large station now being built in Manchester from the designs of Messrs. Woodhouse and Willoughby and Langham, those at Sheffield (by Mr. Joseph Norton), Aberdeen (by Mr. A. H. L. Mackinnon), Bournemouth (by Mr. F. W. Lacey, F.R.I.B.A.), and others. Drawings of the stage at Covent Garden Theatre are also shown. Some photographs of buildings struck by lightning are exhibited by the Lightning Research Committee of the R.I.B.A. One of the most interesting examples is a house at Heathfield, Sussex, which was twice struck by lightning in 1902, although "protected" by at least eight lightning rods. Another interesting photograph is that of the wall-paper of a room, showing two small holes made by the lightning on entering and leaving the room; it appears that the lightning passed from the iron eaves-gutter to the supporting bracket which was fixed in the wall, and continued its path from the end of the bracket through the wall, and passed out at a lower level without doing serious damage. A map lent by Messrs. J. W. Gray and Son, of 115, Leadenhall-street, E.C., shows the distribution



A Small House near Bagshot.



of 1,394 buildings in England and Wales reported to have been struck by lightning between January 1, 1898, and May 18, 1903.

A Fire Exhibition would not be complete without exhibits of fire-engines, escapes, alarms, and other apparatus required by fire-brigades, and these may be seen at Earl's Court in great variety, notably at the stands of Messrs. Shand, Mason, and Co., and Messrs. Merryweather and Sons, in the Imperial Court.

A SMALL HOUSE NEAR BAGSHOT.

THIS house has been erected at Carley Hill near Bagshot. The walls are built of brick, and are covered with rough cast, as the house stands well up and is open to the south-west. The outside joinery is painted white—with the exception of doors and shutters, which are dark green. The fireplaces have been planned anglewise by special desire.

The architect is Mr. F. Winton Newman, and the builders are Messrs. Mussellwhite, of Basingstoke.

ENGINEERING SOCIETIES.

THE JUNIOR INSTITUTION OF ENGINEERS.—The summer meeting of this Institution, which has recently taken place, was exceptionally well attended, a circumstance no doubt due to the particularly attractive character of the programme provided. The proceedings opened at the Town Hall, Sheffield, where the Lord Mayor welcomed the Institution, after which the members visited the works of Messrs. Davy Brothers, at Attercliffe, when they had the opportunity of seeing in course of erection the most powerful armour-plate mill yet constructed. It is for the Imperial Japanese Government, and will be capable of rolling a 40 or 50 ton hard chrome steel ingot into a plate in about 15 minutes. The next visit was to Messrs. Hadfield's Steel Foundry Works, at Tinsley. A most interesting afternoon was spent in the inspection of the splendid foundry, where steel casting for hydraulic, marine, and other machinery, track work, points and crossings, and mining machinery of all kinds were being turned out. Haddon Hall and Chatsworth House were visited on the following day, and next morning the works of Messrs. Charles Cammell and Co. were opened to the members, an armour-plate for H.M.S. "Hindustan" being specially rolled on their arrival. The various other processes incidental to armour-plate manufacture were shown, and file-making, tool-steel rolling, general forgings, and crucible steel melting furnished other features of interest. In the foundry, marine, locomotive, dynamo, and other castings were in hand. The party afterwards proceeded to the works of Messrs. James Dixon and Sons, where the numerous operations involved in the manufacture of silversmiths' goods were witnessed. The whole of the following day was spent in an excursion to Castleton for the purpose of going through some of the remarkable caves there. The Speedwell and the Blue John, which takes its name from the wonderful mineral mines, were inspected. Next day the Toledo Steel Works of Messrs. John Henry Andrew and Co. were visited. Springs, wire, Siemens and Bessemer steel, and specialities in casting steel, rolling mills, mining tools, etc., afforded ample subjects for the morning's inspection, and in the afternoon the Master Cutler's Works (Messrs. Thomas Turner and Co.) were visited. Here cutlery of all kinds was being made, the striking feature being the large amount of work which was being done by handicraft. The series of visits was brought to a close by inspecting the works of Messrs. Mellowes, where the well-known "Eclipse" roof glazing is produced, and in the evening the institution summer dinner was held at the Royal Victoria Hotel, the chairman, Mr. Kenneth Gray, presiding. The Master Cutler, the Deputy Lord Mayor, representatives of the different works visited throughout the week, and other guests were present. An illuminated vote of thanks was presented to Mr. Ernest King in recognition of his valuable service as honorary local secretary of the meeting.

BUILDING BY-LAWS IN JOHANNESBURG.

THE *Transvaal Government Gazette* has published the text of the by-laws adopted recently by the Johannesburg Town Council, and now approved by the Lieutenant-Governor, for regulating the construction and arrangement of building and laying out of streets within the municipality. Subjoined is a summary of some of the principal clauses:—

The by-laws are not to apply, save in certain exceptional circumstances, to any building now in existence or hereafter to be erected on any mining ground which is used or intended to be used exclusively for the purpose of carrying on mining operations or of storing mining materials.

Every person intending to lay out a township, or subsidise any piece of ground, within the municipal area for the purpose of sale, hire, or transfer, must submit plans to the town engineer, showing any proposed new streets, with the widths and names thereof, the stands or lots into which it is proposed to subdivide the ground, with their numbers and dimensions; also showing the true north point, also all angles observed or measured in surveying the township or ground. Such plans shall also show the levels of the different streets and points at not more than 200 Cape feet apart, referred to some known datum or bench mark. [1,000 Cape feet equal 1,033 English feet.]

Except where local topographical conditions prevent, all blocks of ground in any subdivision shall be rectangular. No block shall exceed 2½ morgen, nor shall any block be less than one morgen [two English acres], except by special permission of the Council. The lengths of blocks shall be from two to three-and-a-half times their depth, and such depth shall not be less than 200 Cape feet. The principal thoroughfares shall be parallel to the short side of the blocks.

Every person so laying out new streets shall cause such streets to preserve continuity of line, access, and grade with streets already laid out. No street shall be less than 40 Cape feet in width, and where the Council deem that any proposed street is likely to be used as a main thoroughfare the Council may require it to be of any greater width, not exceeding 120 Cape feet. Every street shall have an entrance equal in width to the width of such street.

So far as possible streets shall be laid out so that no gradients steeper than 1 in 15 may occur in them. On main roads gradients steeper than 1 in 30 shall as far as possible be avoided.

Where trees are planted in streets or roads they shall be planted in rows so as not to obstruct the traffic. No two rows shall be nearer to each other than 20 ft., and the distance apart of trees in the same row shall not be less than 15 ft.

Any person intending to construct a new street shall, in addition to the plans and specifications required as aforesaid, submit drawings showing intended sidewalks, kerbing, carriageways, etc., and accompanied by specifications of the materials to be used and work done in the construction of such street.

No building or structure shall be erected within the municipal area which the Council shall deem to be a disfigurement to the town or neighbourhood or any annoyance to the inhabitants thereof.

Every person erecting a new building shall construct every external or party wall thereof of stone, brick, or concrete, or other hard and incombustible material, or of wood, iron, or steel framing, covered with corrugated iron or other incombustible material.

The cubical contents of any single compartof a building of the warehouse or office class shall not exceed 250,000 cubic feet. Where the aggregate cubical contents of two or more compartments of any building exceed that amount such compartments shall be separated by fireproof walls and no part of any opening in such shall exceed 8 ft. above the floor next below it.

No person shall erect any building of raw and unburned bricks except at such place as the Council may approve, and then only where there shall be a clear space of not less than 15 ft. from the nearest building, and no such building shall exceed one story of 15 ft. in height. The thickness of external walls of unburned brick shall not be less than 12 in. No wall shall be composed of burned and unburned bricks built together.

All new buildings on a stand or lot facing a business street shall have their walls constructed of hard-burned bricks, terra cotta stone, or sound and hard concrete or other such material, built with lime, mortar, or cement mortar.

In all dwellings or buildings used for domestic purposes on damp ground the floor of the cellar or the ground below the ground floor shall be covered with hydraulic lime, concrete, cement, or other impervious material at least 4 in. thick.

No building shall exceed in height on any of its front or faces one and two-thirds the width of the public street adjacent to such front or face measured from the kerb line to the top of eaves, gutter, or parapet. No building, wherever it may be situated, shall exceed 140 ft. in height measured as above. Roof slopes shall be such that a line drawn from the ground level at the opposite side of the street to the top of eaves, gutter, or parapet of buildings of the maximum height shall clear them. Towers or turrets may be carried to a height greater than specified above provided that they do not occupy more than 1-5th of the frontage and that each tower shall not exceed 400 square feet in area and 20 ft. on the street frontage.

No person shall, within the fire limits of the municipal area, build any erection constructed of or covered with wood, canvas, reed, or other matter of a combustible nature, or roof a building with thatch, reed, or other inflammable material. Such material, however, may be used outside the fire limits provided that no portion of such structure shall be distant from the boundary of the ground on which it is situated, or from buildings in a different occupation, not less than 20 ft.

All walls of dwelling-houses shall have a proper damp course of tar, sand, slate, cement, or other durable material impervious to moisture beneath the level of the timbers of the ground-floor and above the ground level when considered necessary by the town engineer.

All party walls of buildings shall be built up from their foundation without openings, and shall be carried up above the roof 18 in. in the case of domestic and office buildings, 2 ft. 6 in. in the case of warehouse buildings, and 3 ft. in the case of public buildings, measured in each instance at right angles to the slope of the roof; and except where otherwise expressly specified, such wall shall not be les than 8½ in. in thickness and shall be coped with stone, cast-iron, terra cotta, or brick set in cement mortar.

Any person intending to erect a building exceeding 100 ft. in height shall give notice of his intention by public advertisement not less than one month before the plans are submitted to the Council, in order that any adjoining owners who may consider themselves likely to be prejudiced by the erection of such public buildings may lodge their objections and protests with the town engineer before the plans are considered.

Every domestic building hereafter erected exceeding 45 ft. and less than 60 ft. in height shall have the second and third story floors fireproof.

METROPOLITAN ASYLUMS BOARD.

AT the first meeting of the Metropolitan Asylums Board, after the summer recess, on Saturday last, it was agreed that the plan prepared by Messrs. A. and C. Harston, architects, for the extension of the tramway at the Joyce Green Hospital, be affirmed, and that tenders for the necessary work be invited by public advertisement.

The Works Committee reported that they had instructed the Clerk to reply to the following effect to the Local Government Board, who had asked for certain further information with reference to the Managers' application for an order authorising them to incur additional expenditure, not exceeding 3,468*l.* in connection with the drainage, etc., at the Millfield Convalescent Home at Rustington:—"When the Local Government Board issued their order for 20,500*l.* in respect of the erection of the Millfield Homes in February, 1901, they intentionally omitted a sum of 500*l.* which had been provided for the proposed cost of drainage works, the mode of draining the homes not having then been considered. The Board subsequently issued an order for 698*l.* in respect of the septic tanks. This amount did not, however, include the drainage of the home as far as the septic tanks, neither did it include the cost of the sewage outfall, which was not contemplated as necessary, but which had to be constructed and carried from the tanks to low water-mark of ordinary spring tides, a distance of nearly 1,400 ft. from the breastwork, to meet the requirements of the Board of Trade. There were not, therefore, any deductions from, additions to, or amendments in the original scheme sanctioned by the Local Government Board."—The Works Committee also submitted plans by Messrs. T. W. Aldwinckle and Sons, architects, for the erection of a boat-house and workshop (involving the demolition of the old timber gantry) at the South Wharf, the cost of which was estimated to be 950*l.* for the erection of the building and 200*l.* for the demolition of the timber gantry. It was agreed to approve of the plans, and to forward them to the Local Government Board for their sanction.

TRADE CATALOGUES.

MESSRS. ROBERT W. BLACKWELL & CO., LTD., 59, City-road, E.C., have sent us a sample of their "Ruberoid" damp-course, and a pamphlet containing information about this and their "Ruberoid" roofing. The damp-course is pliable and waterproof, and resists crushing stresses remarkably well; it is said to be rot-proof, and unaffected by lime and cement, and as it is sold in widths suitable for all ordinary walls, at a moderate price, it will probably be largely used. The roofing is sold in 36-in. rolls, and is laid on roof boarding, the seams being cemented with "Ruberine." Full directions for laying it are given in the pamphlet. "Ruberoid" is said to be fire-resisting, but the sample sent appears to be inflammable.

A sample of "Stoniflex" roofing felt has reached us from Messrs. D. Anderson & Son, Ltd., Lagan Felt Works, Belfast. The material appears to be well adapted for the roofs of light and temporary structures, and the price is low. This, and other roofing felts have been largely used by this firm on the roofs of factories and workshops of various kinds, some of which are illustrated in their interesting catalogue of "Belfast Roofs." In these roofs the trusses are of wood, of the bow-string lattice type, and are covered with boarding on which the felt is laid. The trusses are light and economical, and have been used for spans of 100 ft. Another catalogue from Messrs. Anderson deals with silicate cotton or slag-wool, and shows its uses in domestic buildings, and also for the insulation of cold stores. By the arrangement shown in detail No. 12 for "fire and sound proofing," an ordinary joisted floor can be applied to existing ceilings without difficulty. Prices of this material and of felts of various kinds are given in a separate price-list.

From the Lubrose Paint Co., Moorgate Station Chambers, E.C., we have received a descriptive pamphlet, price-list, and samples of their Lubrose paint, which is made in Hamburg, and appears to have been extensively used in Germany and, to a smaller extent, in Holland, France, and Norway. The testimonials show that it has been successfully used on iron, wood, cement and concrete, and other materials. It appears to be durable, proof against damp and acids, and easily applied. The composition of the paint is not stated, but it evidently differs from ordinary paints, as a safety-lamp or electric-light must be used when the paint is being applied in dark, closed spaces, or where there is no air circulation.

The Powell Wood Process Co., of 6, Stanley-street, Liverpool, sends a descriptive pamphlet on "Powellised Timber." The process consists in boiling timber in a saccharine solution and afterwards evaporating the moisture in a drying chamber, and is said to harden the timber, increase its strength, weight, and durability, check the tendency to dry rot, and reduce the tendency to warp, split, shrink, and expand. Some tests are given comparing the absorption, transverse strength, and compressive strength of timbers "processed and not processed," and while they show in the main the superiority of the "processed" timber, they are not altogether convincing. The strength of scantlings cut even from the same tree varies so much that no reliance can be placed on a few tests; a long series of careful experiments would have to be carried out before a definite opinion as to the advantage of the new process could be given. The tests mentioned in the pamphlet are not all in favour of the process, although at the first glance they appear to be: thus, the bending tests of yellow pine give the breaking load of the "processed" specimen as 7¼ cwts., and that of the "non-processed" as 6½ cwts., but when the slight difference in dimensions is taken into consideration, the "non-processed" wood is found to have the greater coefficient of rupture. If the process will render timber more durable and will reduce to any appreciable extent the shrinkage and warping, without injuring the wood in any way, it will probably be adopted, whether it increases the strength or not.

The "Empress Smoke Cure," with revolving cowl, made by Messrs. Ewart & Son, Ltd., 346-350, Euston-road, N.W., has already been mentioned in these columns. The same firm's "Victoria" ventilator is on similar lines. We have also received from Messrs. Ewart & Son an illustration and price-list of their "B"-pattern califont—a geyser heated by gas, and supplying hot water under pressure to any part of the house. It is made in eight sizes, the stated capacity ranging from 1½ to 16 gallons of warm water per minute.

From Messrs. George Jennings, Ltd., of 63-67, Lambeth Palace-road, S.E., we have received their "temporary catalogue" of lavatory fittings. Tip-up basins are a special feature, but other kinds of basins are shown.

Some of the basins rest on wood enclosures, while others are supported on metal legs or brackets. Most of the designs for the woodwork and ironwork leave much to be desired, but many of the basins appear to be thoroughly satisfactory. Everyone knows that the prices in a trade catalogue of this kind are subject to a discount, and that the discounts allowed by different manufacturers vary from about 10 per cent. upwards. The discount allowed by Messrs. Jennings is not stated in the catalogue, but the prices of many of the fittings are so high that we assume the discount to be exceptionally large. One shampooing lavatory with tip-up basin, statuary marble slab, white metal legs, and plated fittings, is priced 60*l.*, and a simple panelled cupboard front under a basin is priced 3*l.* for deal, and 5*l.* 5s. for mahogany, with an extra of 1*l.* or 2*l.* 10s. respectively for each returned end; a slightly more elaborate front is priced 6*l.* for deal, and 10*l.* for mahogany, with extras of 2*l.* 10s. and 4*l.* 10s. for each returned end. These prices are so high that many architects will decline to specify the fittings or to show the catalogue to their clients.

Mr. F. Wallis Stoddart, of the Western Counties Laboratory, Bristol, sends us a pamphlet containing a short description of the Stoddart Continuous Sewage Filter. The special feature of this filter is the method of distributing the sewage, but as this has already been described in these columns, we need only repeat that the distributor is designed for the purpose of allowing the sewage to fall in drops equally over the whole surface of the filter. The pamphlet contains information as the area and depth of filter required, and illustrations drawn to scale. A photographic illustration of a large filter of this kind at Salisbury, forms the frontispiece. The filter is well adapted for small purification works, such as those required for country-houses.

The Hartshill Brick & Tile Co., of Stoke-upon-Trent, send us their new catalogue of glazed bricks, roofing tiles, ridges and finials, floor-tiles, red and buff chimney-pots, paving-bricks, drain pipes and traps, sinks, and other clayware. The catalogue is a comprehensive one, and the opening edges of the leaves are cut out and printed to form a "thumb index," which facilitates reference. The illustrations occupy the right-hand pages, and the prices face them. The catalogue will be of service to architects and builders. A closely-printed page of "builders' notes" contains some useful memoranda, a few of which, however, stand in need of revision.

Messrs. Hart, Son, Peard, & Co., Ltd., ironmongers, of 138-140, Charing Cross-road, W.C., and Grosvenor Works, Birmingham, have sent us their new catalogue of builders' ironmongery, brasswork, &c. It contains nearly one hundred pages, and as the illustrations are small (though clear), a very large number of fittings are shown. We do not notice anything particularly novel or artistic, but the catalogue may be recommended as a work of reference for general use. It is fully priced, and contains a complete index.

A more elaborate catalogue of builders' ironmongery and brasswork has reached us from Messrs. Colledge & Bridgen, Midland Works, Wolverhampton. It contains 112 pages and is printed on good paper and well bound. Many of the illustrations are reproduced from photographs. Among the contents we notice some artistic door furniture, including *repoussé* lock-plates and finger-plates, handles and knobs of various kinds, Suffolk latches, &c. The catalogue includes also locks, casement stays and fasteners, espagnolette and other bolts, hinges, fanlight-openers, name-plates, hat and coat hooks, air-grates, and other goods. Wrought-iron safes and porcelain enamelled iron baths are also shown. The architect and builder will find the catalogue useful.

We have received from the Simplex Steel Conduit Co., Ltd, of Norfolk-street, Strand, an abridged price-list of their wiring accessories and fittings, and notice that two new types of conduit are listed which are intended for high-class installation work. The "Simplex Wireduct Conduit" has screwed ends, so that it is perfectly watertight, and has a smooth interior and exterior surface. As its price compares favourably with gas barrel, there ought to be a demand for it. The "Simplex Solid Drawn Conduit" is manufactured from Siemens-Martin steel, and is seamless throughout. Although more costly than other types of conduit, yet, as it admits of being bent when cold, a saving can be made, as fewer "bends" will be required to set up the conduit. The price-list is of a very convenient shape and size, and as it contains a reprint of the rules of the Institution of Electrical Engineers, it is useful to keep for reference.

We have received a booklet from Messrs. Lawrence, Scott, & Co., of Norwich, entitled "Notes on Electric Motors." It is intended primarily for engineers who have only occasionally to manage electric motors, but electrical engineers will find it both interesting and instructive. The non-technical descriptions given of the working of series and shunt motors are very good, and will be useful in helping the general reader to understand the main points of difference between the two types of motor. The relative advantages of carbon and copper brushes are impartially stated, and the diagrams given of the starting switches and the regulating resistances for motors can be readily followed. The diagrams given of multipolar motors illustrate the great improvements that have recently been introduced into the design of this class of machinery, and the modern electric motor is a thoroughly trustworthy machine.

Correspondence.

FISCAL POLICY AND BUILDING.

SIR,—In reference to your article re Fiscal Policy and Building, you raise the question of an import duty on timber, but I think you will find that several speakers have stated that it is not intended to impose duties on raw materials other than what can be obtained within the boundaries of the United Kingdom, or her colonies, or that by the imposition of a small duty could be caused to be procured within such boundaries, say, by afforestation (you had an article on this recently, deploring the absence of timber in England); and you must also give our legislators credit for having the common sense not to strangle such an important industry as the building trade by the imposition of large duties, until such time as the home market could supply timber in sufficient quantities, and at the same rate at which the article could be procured from foreign markets, less duty. I am sure that a duty on imported joiners' work would be a great help to the steam joinery works of the kingdom, thus giving more employment to carpenters and mechanics, and incidentally to the building trade in erecting the works, and your artistic eye would not, in the future, be shocked by nasty and inferior joiners' work, or art furniture that is all glue and whiffle.

B. AUSTIN.

BOOKS RECEIVED.

THE ELEMENTS OF ELECTRICAL ENGINEERING. By Tyson Sewell, A.I.E.E. Second edition, revised. (Crosby Lockwood & Son.)

SAINT ALBANS: THE CATHEDRAL AND SEE. By the Rev. Thomas Perkins, M.A. (George Bell & Sons.)

THE ENGINEER IN SOUTH AFRICA. By Stafford Ransome, M.Inst.C.E. (Archibald Constable & Co.)

The Student's Column.

CONCRETE-STEEL.—XI.

PROFESSOR HATT'S THEORY OF BEAM DESIGN (*continued*).

IN practical computations n, m, u, and p, are settled; x is then calculated from formula (4), c and f are determined by the aid of (1) and (2), and finally the moment of resistance is ascertained from (5). As the moment of resistance is always equal to the bending moment, it is easy to ascertain the load corresponding with any conditions of loading and span.

Example I. For the purpose of practically illustrating the application of the formulas, we will now calculate the load at the point A, for one of the beams tested by Professor Hatt, selecting a proportionate reinforcement of one per cent. placed two inches above the bottom of the beam. We will take the following values for the ratios, viz.:—

$n=2$, $m=12$, $u=(6\div 8)=0{\cdot}75$, and $p=0{\cdot}01$.

The first two of these differ fractionally from the ratios found by Professor Hatt, and the results will consequently be slightly different from those in Tables XXII. and XXIIa.

The first step is to compute the value of x, serving to settle the height of the neutral axis. Thus:

$$x=\frac{-\frac{1}{2}(4+3pm)+\sqrt{4n+9\cdot 4p^2m^2+p\left[6m\left\{n(n-1)+1\right\}\right]}}{2(n-1)}$$

$$=\frac{-\frac{1}{2}(4+3\times 12)+\sqrt{(8)+(9\cdot 4\times 0144^{*})+0{\cdot}01\left[72\left\{0{\cdot}75+1\right\}\right]}}{2(2-1)}$$

$$=\frac{-\frac{1}{2}(4{\cdot}36)+\sqrt{(8+0324)+0{\cdot}01\left[72\left\{1{\cdot}75\right\}\right]}}{2}$$

$$=\frac{0{\cdot}868}{2}$$

and finally the value of the ratio $x=0{\cdot}434$.

As in this case $h=8$ in., we have $hx=8\times 0{\cdot}434=3{\cdot}472$ in., and the height of the neutral axis above the bottom of the beam $=h-hx=4{\cdot}528$ in.

Calculations for the determination of x might be materially simplified for concrete of constant quality, and further simplification would result from the preparation of separate forms of rule (4) for the four ratios stated, or for any desired values of p.

As an example we append a condensed form of the equation, in which the values of n and m, for the quality of concrete before considered, and p, for one per cent. of reinforcement, are treated as constants. Thus:

$$n=2\ ;\ m=12\ ;\ \text{and}\ p=0{\cdot}01.$$

For all cases complying with these conditions, the condensed formula then becomes:

$$x=\frac{-2{\cdot}18+\sqrt{8{\cdot}0324+0{\cdot}72(u+1)}}{2}\qquad(4a.)$$

Here the only variable factor is the value of u which remains to be settled by the designer as may best suit his convenience. Similarly simplified forms of the equation can be prepared for any other proportions of reinforcement and qualities of material.

To resume the present calculation, we have next to compute the values of c, the maximum compressive fibre stress in the concrete, and f, the tensile stress in the reinforcement.

For the purpose of finding c, we take t, the limiting fibre stress of concrete in tension at 300 lbs. per square inch. Then by rule (1), we have

$$c=tnx\div(1-x)$$

$$=(300\times 2\times 0{\cdot}434)\div(\cdot 566)=460\ \text{lbs.}$$

also by rule (2),

$$f=tm(u-x)+(1-x)$$

$$=\left\{300\times 12(0{\cdot}75-0{\cdot}434)\right\}\div(0{\cdot}566)=2{,}009\text{lbs.}$$

Next, we determine the moment of resistance R, of the section, by rule (5)* Thus:

$$R=lbh^2\left\{\tfrac{1}{2}\tfrac{8}{3}(1-x)^2+\frac{5nx^3}{12(1-x)}+f\frac{(u-x)^2}{1-x}m\right\}$$

$$=300\times 8\times 64\left\{\tfrac{1}{2}\tfrac{8}{3}(0{\cdot}566)^2+\frac{5\times 2\times 0{\cdot}434^3}{12\times 0{\cdot}566}\right.$$

$$\left.+0{\cdot}01\frac{(0{\cdot}75-0{\cdot}434)^2}{0{\cdot}566}12\right\}$$

$$=153600\left\{0{\cdot}13348166+0\,12035+0{\cdot}02117088\right\}$$

$$=153600\times 0\,27501=42{,}241{\cdot}53\ \text{inch-lbs., say}\ 42{,}240\ \text{inch-lbs.}$$

Finally we find the theoretical concentrated load in the following manner:

As R = M, it follows that M = 42,240 inch-lbs.

But $M=\frac{Wl}{4}$, and as in this case $l=80$, we have

$$M=20\ W\ \text{inch-lbs.}$$

Hence

$$W=42{,}240\div 20=2{,}112\ \text{lbs.}$$

By reference to Table XXII., it will be seen that this result very nearly agrees with that given for the load at point A, the small difference between the calculated loads being due to our slight modification of the values for n and m.

Similarly the theoretical distributed load would be thus ascertained:—

As $M=\frac{Wl}{8}$ it follows that M = 10 W inch-lbs.

Hence

$$W=42{,}240\div 10=4{,}224\ \text{lbs.}$$

Example Ia. For the purpose of preparing a table or diagram of beams, considerable time will be saved by calculating the moment of resistance per inch width of the section. Then for the beam considered in Example I., we

* In printing rule 5 on p. 253 (*ante*) the symbol *m* accidentally omitted.

have values of x, c, and f, as before, and the moment of resistance per inch of width becomes

$$R = tbh^2 \left\{ \tfrac{1}{12}(1-x)^2 + \frac{5nx^2}{12(1-x)} + p\frac{(u-x)^2}{1-x}m \right\}$$

$$= 300 \times 1 \times 64 \left\{ \tfrac{1}{12}(0{\cdot}566)^2 + \frac{5 \times 2 \times 0{\cdot}434^2}{12 \times 0{\cdot}566} + 0{\cdot}01\frac{(0{\cdot}75-0{\cdot}434)^2}{0{\cdot}566}12 \right\}$$

$$= 19200\{0{\cdot}13348166 + 0{\cdot}12035 + 0{\cdot}02117088\}$$

$$= 19200 \times 0{\cdot}27501$$

$$= 5{,}280{\cdot}19 \text{ inch-lbs., say } 5{,}280 \text{ inch-lbs.}$$

From this value of R, the corresponding concentrated load is

$$W = 5{,}280 \div 20 = 264 \text{ lbs.,}$$

and the distributed load is

$$W = 5{,}280 \div 10 = 528 \text{ lbs.}$$

The corresponding load for any width of a beam 8 in. deep and otherwise complying with the conditions stated in Example I., can now be ascertained by a simple multiplication sum.

Example II. We will next take a beam similar to that for which the essentials are stated in Example I., but with a depth of 12 in.

Then by rule 4a

$$x = \frac{-2{\cdot}18 + \sqrt{8{\cdot}0324 + 0{\cdot}72(u+1)}}{2}$$

In this case, the reinforcement still being 2 in. from the bottom, the ratio $u = (10 \div 12) = 0.833$. Substituting this value in the equation we have

$$x = \frac{-2{\cdot}18 + \sqrt{8{\cdot}0324 + 0{\cdot}72(0{\cdot}833+1)}}{2}$$

$$= \frac{-2{\cdot}18 + \sqrt{8{\cdot}0324 + 1{\cdot}32}}{2}$$

$$= \frac{-2{\cdot}18 + 3{\cdot}058}{2} = 0{\cdot}439.$$

This means that $hx = (0{\cdot}439 \times 12) = 5.268$ in., and that the height of the neutral axis above the bottom of the beam is $(12 - 5.268) = 6.732$ in.

For the moment of resistance per inch in width of the section we have, by rule (5)

$$R = 300 \times 1 \times 12^2 \left\{ \tfrac{1}{12}(1-0{\cdot}439)^2 + \frac{5 \times 2 \times 0{\cdot}430^2}{12(1-0{\cdot}439)} + 0{\cdot}01\frac{(0{\cdot}833-0{\cdot}439)^2}{1-0{\cdot}439}12 \right\}$$

$$= 43{,}200\{0{\cdot}131133 + 0{\cdot}1257 + 0{\cdot}033\}$$

$$= 43{,}200 \times 0{\cdot}289833 = 12{,}520 \text{ inch-lbs.}$$

The corresponding loads found in the manner previously indicated, are

(*a*) Concentrated load $W = 12{,}520 \div 20 = 626$ lbs.

(*b*) Distributed load $W = 12{,}520 \div 10 = 1{,}252$ lbs.

As before, the load for any width of a beam, 12 in. deep and otherwise complying with the stated conditions, can now be found by multiplication.

In all the foregoing calculations, we have been dealing with a span of 80 in., that being the distance between the supports in the case of the beams tested by Professor Hatt.

But, having the moment of resistance of any given section, the load can easily be computed for a unit span, and from the values so obtained the load for any other span can be found by a simple division sum.

By Example Ia, we found the moment of resistance per inch width of the 8 in. deep beam, with 80 in. span, to be R = 5,280 inch-lbs., and as R = M, M = 5,280 inch-lbs.

But for a concentrated load $M = \frac{W\,l}{4}$.

Hence for a unit span of 1 in.

$$M = \tfrac{1}{4}W \text{ inch-lbs.}$$

Whence

$$W = 5{,}280 \div \tfrac{1}{4} = 21{,}120 \text{ lbs.}$$

For a distributed load

$$M = \frac{W\,l}{8}$$

Hence for a unit span of 1 in.

$$M = \tfrac{1}{8}W \text{ inch-lbs.}$$

Whence

$$W = 5280 \div \tfrac{1}{8} = 42{,}240 \text{ lbs.}$$

These loads are per unit width and unit span of one inch in each case, and to test their accuracy we may compare the results to be obtained therefrom with the calculated loads in Example I.

Thus for a clear span of 80 in. the concentrated load becomes 21,120 ÷ 80 = 264 lbs. per unit width of beam, and for a width of 8 ins. the load is 264 × 8 = 2,112 lbs. as previously found.

Similarly the distributed load is

42,240 ÷ 80 = 528 lbs. per unit width,

and for a width of 8 in. the load is

528 × 8 = 4,224 lbs., as before.

Again, by Example II., we found the moment of resistance of the 12 in. deep beam with 80 in. span to be R = 12,520 in.-lbs. From this we obtain loads per unit width and span as follows:—

For a concentrated load,

$$W = 12{,}520 \div \tfrac{1}{4} = 50{,}080 \text{ lbs.}$$

For a distributed load,

$$W = 12{,}520 \div \tfrac{1}{8} = 100{,}160 \text{ lbs.}$$

If we wish to find the concentrated load for a 12 in. × 6 in. beam with a clear span of 80 in., the result is soon obtained.

Thus:—

$$W = (50{,}080 \div 80) \times 6 = 3{,}750 \text{ lbs.}$$

And the distributed load for the same beam is

$$W = (100{,}160 \div 80) \times 6 = 7{,}512 \text{ lbs.}$$

This case shows incidentally the advantage derived from increasing the depth of a beam in proportion to its width, as the load here carried is more than 75 per cent. greater than the load for the 8 in. square beam previously considered, while the sectional area of concrete is only 12½ per cent. greater.

By the aid of calculations similar to those already made the essential units may be determined for beams varying in depth over any desired range, and by adopting values of p, for different percentages of reinforcement, a series of tables could readily be prepared for office use so that the proportions of a beam for any required duty could be found without the least trouble or delay.

If tables of the kind were prepared they would only apply to the particular quality of concrete and reinforcement taken as the basis of calculation, but if in practice only one type of concrete were employed, there would be no reason for inaccuracy. By adopting steel reinforcement instead of wrought iron, the altered value of E would naturally cause a proportionate modification of the results.

All the foregoing calculations refer to point A, where the curve first deviates from the straight line, and the load in every case includes the weight of the beam. On reference to Table XXII., it will be seen that the load at this point may be taken for one per cent. of reinforcement at about one-third of the load at the point C, representing failure; and the load at the point of A for 2 per cent. of reinforcement may be taken at about one-fourth of the load at failure. As compared with the load at point B, corresponding with the first crack in the tension flange, the load at point A may be put roughly at two-fifths in the case of 1 per cent. of reinforcement, and one-third in the case of 2 per cent. of reinforcement. For all practical purposes we may regard the first crack as representing failure, and it is evident that some further factor of safety should be applied to results based on point A conditions. No further calculation is necessary in such cases, if tables of beams have been prepared, as the estimated load may be increased by any advisable proportion, and a beam can then be selected to suit the total load so given.

By adding 50 per cent. to the estimated load, a total factor of safety of about 4 will be given for 1 per cent. reinforcement, or of about 6 for 2 per cent. reinforcement; and by doubling the estimated load the factors become 6 and 8 respectively.

The proper factor for adoption must, of course, depend upon the character of the work to be executed.

OBITUARY.

MR. FORD.—We have to announce the death, on September 1, at "Homeleigh," No. 4, South Row, Blackheath, after five days' illness, of Mr. Herbert Ford, aged seventy years. Mr. Ford was a member of the firm of Messrs. Ford, Son, and Burrows, architects, of No. 21, Aldermanbury, and was elected a Fellow of the Royal Institute of British Architects in 1870. Of the more recent architectural works carried out from plans and designs by the firm we may instance the following:—The business premises at the corner of Jewin-street and Well-street, erected after the disastrous fire in 1897 in the vicinity of Aldersgate; new premises on the site of Nos. 121-6, High Holborn, at the corner of Southampton-street, for Parr's Bank (1898-9), at a cost of some 15,000*l*., and the adjoining premises; a warehouse and dwelling-house upon plots 6 and 7 in Boundary-street, between Church-street and Old Nichol-street, Shoreditch, for Messrs. J. Rotherham and Co.; great enlargement for Messrs. J. Carter and Sons, of Nos. 50-62, Kingsland-road, Shoreditch; a factory and business premises in Sylvester-street, Hackney, on the sites of Nos. 35-41, for Messrs. Stapley and Smith; the infants' school and a central hall, at Northumberland Heath, Erith, Kent, for the Erith School Board; and the Board offices and cookery centre at the Picardy Schools, Belvedere, Kent, for the Erith School Board. The firm were the architects of warehouses in the City for Messrs. Cooke, Son, and Co. (Friday-street); Crocker, Sons, and Co. (Friday-street); D. Evans and Co. (Milk and Wood streets); Tubbs, Lewis, and Co. (Noble-street); I. Salaman and Co. (Falcon-square), and many other commercial firms.

GENERAL BUILDING NEWS.

ELDER LIBRARY, GOVAN.—The Free Library which has been presented to the burgh of Govan by Mrs. John Elder, was recently opened. The library is situated in the south-east corner of Elder Park, and is entered from the corner where Thomson-street and Langlands-road intersect. The principal elevation, which is towards the street, contains an entrance colonnade that forms a centrepiece to the building, and is surmounted by a balustrade, in the centre of which is carved the Govan coat of arms, with the burgh motto, "Nihil sine labore." The style of architecture is purely classic, and the aim of the architect, Mr. John Burnett, A.R.S.A., has been to make the library as far as possible part of the park, from which it is cut off by only a light railing. The building consists of three floors. The basement is utilised as a book store, workshop, packing-room, and furnace-room. On the ground floor there are the news-room (53 ft. by 23 ft.), reference libraries for ladies and gentlemen, librarian's room, and a large committee-room. The lending library, which is 45 ft. by 22 ft. 3 in., and capable of accommodating from 30,000 to 40,000 volumes, is also situated on this floor. From the corridor a stair leads to the upper flat, which is to be used as a museum and juvenile room, there being separate compartments in the latter for boys and girls. From the roof and over the main entrance there rises a small dome with flagstaff.

PALACE THEATRE, SUNDERLAND.—The Palace Theatre of Varieties, Sunderland, was recently reopened, after having been closed for several months in order that alterations of an extensive character might be made. The stage which, together with the proscenium, has been brought forward 10 ft. The proscenium arch is supported at each side by two handsome Corinthian pillars, with embellished pedestals, and consoles at the top of each, and the summit of the arch is panelled and enriched with fine mouldings, the whole being crowned with a classic cornice, with medallion incidentals. A large shield, treated in silver and gold, adorns the centre of the arch. The four boxes on either side are surmounted above the second circle level with handsome balustrades, above which have been erected finely proportioned domes, which, when illuminated with their numerous red, white and blue electric lights, add greatly to the beauty of the hall. The prevailing tints in the whole of the decorations are vermilion and gold. Additional dressing rooms have been made for the convenience of the artists, and among the other improvements may be mentioned the up-to-date lighting facilities on the stage, electric lighting for the whole building, increased accommodation for the orchestra, and the reseating of the building. A great change has been made in the modes of exit from the pit, pit stalls, second circle, and gallery, commodious passages leading into the back lane having been made by leasing part of the adjoining property. The new exit from the pit has enabled the management to close up the undergound passages. The alterations were designed by Messrs. W. and T. R. Milburn, Sunderland, and the contractors engaged on other parts of the work were:—Building, Mr. T. P. Shafto; seating, Messrs. Reynolds, Leeds; upholstery, Messrs. Robson, Newcastle; decorating, Mr. George Tawse, Sunderland; electrical enginering, Messrs. Steinthal and Co., and plastering, Mr. John Rule.

ADDITIONAL WING TO THE RICHMOND HOSPITAL.—The increasing number of out-patients treated at the hospital has rendered the accommodation, which for the last thirty-six years has done duty as the out-patient department, totally inadequate for that purpose, and the committee are now building in Shaftesbury-road new accommodation for this branch of the work of the hospital, and making other im-

portant additions. This building is being erected on the site of several small houses, recently pulled down, adjoining the hospital, and fronting in Shaftesbury-road.—The new building will have a wide entrance, with vestibule, in Shaftesbury-road, and will contain on the ground floor, entrance hall, large waiting hall for out-patients, consulting and examining rooms, dispensary and waiting rooms; on the first floor, approached by stone stairs from entrance hall, will be eye, ear, and throat rooms, and X-ray room, etc.—The new buildings are to be connected to the main building of the hospital by means of a covered corridor. The chief feature of the new building is the large waiting hall for out-patients. The hall is to have an open timbered roof, with enriched plaster panels between roof trusses, and a large glazed lantern light is to run nearly the whole length of the hall. The walls, chimney piece, etc., are to be in glazed ceramic ware, and the floor in polished wood blocks. All the buildings are being erected on the latest hygienic principles. The building is being erected by Messrs. S. N. Soole and Sons, from the designs of Mr. Frank J. Brewer, architect.

NEWPORT (MON.) CHURCH.—The corner-stone of St. Luke's Church, Newport, was laid recently. The new St. Luke's is being built upon the site of the old church in Bridge-street and of four cottages at the back of Railway-street. There will be a considerable extension of the former area. The nave is to be 87ft. long by 33ft. wide, with side aisles 11ft. wide, and the chancel 20ft. long. An organ-chamber, vestry, choir vestry, and morning chapel are also provided. It is being erected in the Early English style of architecture. All the windows are lancet-headed, the west window in Bridge-street above the porch being a lofty, three-light one, and the east window having five lights. The arcading is carried on stone columns, and the roof lined with pitchpine. Local stone, with freestone dressings, is being used in the walls. The floors will be laid with wood blocks, and it is intended to introduce electricity as the illuminant. Messrs. Habershon, Fawckner, and Co., of Newport and Cardiff, are the architects, and the contract, which amounts to 4,300*l.*, is let to Messrs. A. S. Morgan and Co., builders, of Newport.

PARISH HALL, PRUDHOE-ON-TYNE.—On the 7th inst. the foundation-stones were laid for a parochial hall, to be erected on a site near the Vicarage, given by the Duke of Northumberland. The structure will provide accommodation for 500 persons. The hall will be of brick, with stone dressings, measuring 59 ft. in length by 24 ft. 6in. wide. In addition to the main building two cloak-rooms, two retiring-rooms, together with a kitchen and scullery, will be erected. The contract for the work has been placed in the hands of Messrs. Watson & Son, Bridge-end, Stocksfield, the architect being Mr. S. D. Robins, of Newcastle. Irrespective of furnishings, the hall is estimated to cost about 1,500*l.*

STAINED GLASS AND DECORATION.

STRAFFAN CHURCH, CO. KILDARE, IRELAND.—Some memorial fittings of an elaborate character have been added to the chancel of this church. The main feature is a Reredos, containing a sculptured representation of the Last Supper, in white wood, under carved canopies in oak. The plan of the chancel is octagon, and the walls throughout are enriched with carved oak panelling up to the sills of the windows. The work was carried out as a memorial to the late Mr. Lynedock Barton, of Straffan House. The whole was executed by Mr. James Forsyth, of London.

NEW WINDOW, PARISH CHURCH, BO'NESS.—The subject is "The Ascension," depicted with Christ rising from the midst of the Apostles, and supported by two angels. The Apostle figures are grouped in devotional attitudes. The tracery is filled with angel figures, in rich crimson and gold, forming a contrast to the colour in the lower lights. The aim has been to produce a work in pure translucent metal, entirely devoid of any kind of surface pigment, the flesh parts, details of diapers, &c., having been cut and modelled in light and shade out of pure glass, like a cameo, each piece of glass being carefully selected with reference to its position in the design; and the light and shade of the colour is of pure glass, thereby gaining great additional brilliancy, as well as purity of light. The inscription, which reads as follows, "To the glory of God and in loving memory of her most gracious Majesty Queen Victoria, born 24th May, 1819, died 22nd January, 1901, this window is dedicated," is executed in hammered pewter, richly chased, and bearing the royal arms in transparent enamel. The artists employed on the execution of the work were Messrs. J. T. Stewart, J. S. Melville, and R. Monaghan.

FOREIGN.

INDIA.—The Government of Bombay has generally approved of the revised scheme of the Bombay Port Trust.——The Eastern Bengal and Southern Railway are about to construct a new station at Charboni, Dacca Section.——On the Northern section of the same railway a new bridge, south of the Punchabibi Station, is to be constructed.——The proposal for the removal of steel plant and rolling mills from Cossipur has been sanctioned, and they are to be re-established on a larger scale at Ishapur.——The Madras Government has notified its intention to help, as far as possible, the establishment of the proposed industrial exhibition in Madras.——Quarters for the housing of the railway staff at Jafferpur Station, on the Eastern Bengal and Southern Railway have been sanctioned.——Reproductions of a selection of best specimens of Indian art ware and handicraft at the Delhi Exhibition are to be published in the Technical Art series which the Survey of India issues from time to time.——A new bridge is to be constructed over the Barakar river on the East Indian Railway.——The Executive Engineer of the Public Works Department at Taunggyi, the headquarters station of the Southern Shan States, has made arrangements to supply the station with pure water, and the sanitary engineer for Burma has the particulars for the necessary pipes and fittings.——The Hlawga waterworks for supplying Rangoon have now been more than one half completed, and it is hoped to finish the work during the present year. The reservoir when full is estimated to store 13,950 millions of gallons of water.——The topographical survey of the Island of Ceylon will be shortly completed.——The new district traffic office to be erected at Delhi is to be built on land recently purchased by the East Indian Railway Co.——The Central gun carriage factory at Jubbulpore, and the rifle factory at Ishapore will be ready for opening next April.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—The partnership between Messrs. Philip E. Pilditch and S. D. Chadwick, architects and surveyors, practising under the style of Pilditch, Chadwick and Co., has been dissolved, and Mr. Pilditch will continue the practice under the style of Pilditch, Chadwick and Co., at 2, Pall Mall East, S.W.

ASSOCIATION OF HOUSE PAINTERS AND DECORATORS.—Mr. James Higson, of Salford, has been nominated by the Council of the National Association of Master House Painters and Decorators of England and Wales for the position of President for 1903-4, and it is probable that the Convention next year will be held at Manchester. The tenth annual Convention meets at Nottingham on the 21st inst., and Lord Henry Bentinck, M.P., is to open the proceedings.

GRAY'S INN GARDEN.—The Benchers of Gray's Inn having resolved to pull down the high wall along Theobald's-road which concealed the garden from view from that side, the building of a dwarf wall with railing is begun by Messrs. Patman and Fotheringham. Entries in the records of the Society's proceedings go to show that the gardens were originally laid out and planted by Sir Francis Bacon. Orders made in 1597-1600 relate to payments "of a summe of 7*l.* 15s. 4d. due to Mr. Bacon for planting of trees in the walkes," of a sum not exceeding 70*l.* for a further supply of more "yonge elme trees . . . . and a new rayle and quicksett hedge . . . . upon the upper long walke at the good discretion of Mr. Bacon and Mr. Wilbraham," and of 60*l.* 6s. 8d. "payd and allowed unto Mr. Bacon for money disbursed about the garnishing of the walkes." On the upper long walk, by the wall, Bacon, when Solicitor-General, erected a summer-house, which he dedicated, 1609, to the memory of Jeremiah Bettenham, Reader of the Inn. The summer-house, as well as the ninety elm and three walnut trees, of which the situation are exactly specified in the records for 1583, have alike disappeared, but close by the cistern on one of the lawns still stands the catalpa tree which it is said was planted by Bacon. Spedding tells us, in his "Letters and Life of Bacon," that Raleigh, when on the eve of starting for his last expedition to America, held long converse with him in Gray's Inn Walks, which afterwards became a highly fashionable place of resort, and are so mentioned by Howell, Pepys, Dryden, Addison, and other writers in the seventeenth and eighteenth centuries. The grounds have since been encroached upon by the erection of Verulam-buildings, as readers of the "Essays of Elia" will recall, and of Raymond-buildings, on the east and west sides respectively. They are now frequented by rooks, crows, and a great variety of birds not usually seen in London. The "Mr. Wilbraham" cited above is, we gather, Sir Roger Wilbraham, Knight, who was elected a Bencher in 1595, and was appointed Solicitor-General for Ireland in 1599, and Master of Requests in the following year.

PROHIBITION OF EXPORT OF WORKS OF ART FROM ITALY.—An act has just been passed to amend the Italian law of July, 1902, for the preservation of works of art, etc., in Italy. That law, it may be remembered, laid down conditions under which alone the alienation of certain categories of works of art would be permitted, together with a scale of duties payable on exportation. It also set forth the conditions required to be fulfilled before any works of excavation could be undertaken in search of antiquities. The amending or supplementary act now passed enacts an absolute prohibition, to be in force for two years, against the exportation of objects of antiquity derived from excavations which are considered of notable or artistic importance, and of other objects of great value in the history of art.

AN INTERNATIONAL COMPETITION.—In a supplementary report on the trade of South Italy, just received at the Foreign Office, Mr. Berner, the British Vice-Consul at Bari, states that the Bill for the construction, up-keep, and working of an aqueduct for the supply of potable water to the three Apulian provinces, Foggia, Bari, and Lecce, has been approved by Parliament, and meanwhile the Superior Council on Public Works has concluded the examination of the regulations and conditions subject to which tenders from private contractors will be received. The international competition will take place on February 1, 1904, and British contractors wishing to tender should not fail to bestir themselves betimes and obtain particulars from the Italian Consuls in the United Kingdom.

HONDURAS MAHOGANY AND CEDAR.—Mr. Cork, the Acting-Governor of British Honduras, reporting from Belize on the Blue Book for the year 1902, observes that the most important feature of the lumber trade has been the increase of exports to the United States of mahogany and cedar. The quantity of mahogany taken by the States in 1902 was 2,226,337 ft., value 111,027*l.*, as compared with 364,724 ft., value 16,957*l.*, in the year 1901. The exports of cedar to the States increased from 131,643 ft., value 6,662 dols., in 1901, to 271,341 ft., value 13,358 dols., in 1902. Moreover, whereas the mahogany and cedar logs have to be squared for the home market, they are shipped in their natural state to the United States, and the cost of squaring is saved by the vendor, and he loses nothing from remeasurement, his wood being bought and paid for on the spot. This means that less capital than formerly is required in the business, and the result is that wood-cutters are exploiting new districts hitherto untouched. The trade in mahogany with England has greatly fallen off, having decreased from 5,586,120 ft. in 1901 to 3,739,340 ft. in 1902—a drop of 1,846,780 ft.

THE QUIMBY SCREW PUMP.—One of the earliest devices for raising water was the Archimedean screw, and examples of pumps worked on this principle are still to be found in countries where irrigation is practised. A somewhat similar principle is involved in the reverse form of the turbine, as applied for pumping purposes, and in the Quimby screw pump, which is now being introduced into this country from the United States. This appliance is very simple in construction, the internal mechanism being limited to two intermeshing revolving double screws, which are rotated at high speed in a closely-fitting cylindrical chamber, at the bottom of which is a fitting for the suction pipe, and at the top a fitting for the delivery pipe. Motion is communicated to the screws by means of a belt-driven pulley, or by the direct connection of an electric motor, as may be preferred. The absence of valves, buckets, slides, and similar moving parts, and the elimination of reciprocating action, conduce to silent operation and freedom from repairs, and further, the pump can be fitted with an automatic attachment, by means of which it may be run without constant care, attendance, and inspection. This pump is made in sizes suitable for delivering, from five gallons to eight hundred and thirty gallons per minute.

BUILDING IN FROSTY WEATHER.—Our Consul-General at Stockholm observes in his latest report that in winter one hears much about the want of employment for bricklayers and others in the United Kingdom on account of frosty weather. Yet any one residing in Stockholm during the winter months can see bricklaying carried on in hard frost as an everyday occurrence. The art of building, the Consul-General says, stands very high in Stockholm, much of the work done being both ornamental and of excellent quality. It seems that a few years ago a series of experiments were carried out to decide the lowest temperature at which bricklaying might be effectively carried on. Three different temperatures decided on were 23deg., 14deg., and 6deg. Fah. The bricks and mortar were, as to quality and conditions, such as are commonly used in Stockholm. The walls thus erected during winter were allowed to stand till the following autumn, when they were torn down, and the results noted were that those built at 23deg. and 14deg. were perfectly satisfactory, the mortar being quite hard

and sound and had to be scraped from the bricks. Those laid at 6 deg. were not satisfactory; the mortar did not adher to all the bricks, which lay loosely embedded in it. These results tend to prove that without any special precaution as to material or labour, bricklaying can be carried on in Stockholm at a temperature as low as 14deg. Fah., or 18deg. of frost. Generally, it may be said that the mortar should be made in a room where the temperature is kept well above freezing point. The brick used in Sweden is of a light or porous character, which readily absorbs the moisture from the mortar. Hard pressed or calcined bricks and stone work generally are not suitable for building during frosty weather, but edgings or ornaments, etc., of such material can easily be dealt with by slightly warming them before bringing them into position. This can be done by keeping them a few days in a wooden shed heated by an open coke stove. In some cases it is found advisable to cover in with rough boarding the part of the wall where such stone work is extensive; then a very small coke fire is found sufficient to keep the temperature high enough to prevent any damage to the mortar. But although brick building can be thus carried on safely under any of the temperatures already named, this does not apply to plaster or cement work, which should not be done at or below freezing point, unless proper heating arrangements are made. In Stockholm 15 or 20 years ago almost all building was broken off during four or five months every winter; it is now the exception it is hindered by frost more than a few days or a few weeks annually. Mr. Graham sums up the matter shortly thus:—(1) The bricks should be porous and perfectly dry, that they may readily absorb the moisture in the mortar; (2) the water, sand, and bricks must all be heated.

CAPITAL AND LABOUR.

SUNDERLAND JOINERS' DISPUTE.—The Sunderland joiners held a mass meeting in the Villiers-street Institute, on the 2nd inst., for the purpose of considering the dispute which at present exists between the house joiners and the masters. Eleven weeks ago the men came out on strike for an increase of ½d. per hour, which would bring the rate up to 10d. per hour. Attempts to effect a settlement failed, the men refusing to accept the suggestion of the mayor. The last proposal of the mayor was that an arbitrator should be appointed; but on a ballot the men refused to accept this by a majority of over 100. The masters then decided upon a lock-out over the area of the northern counties federation, and this would have taken place, but on the previous Wednesday, at a conference held at Leeds, the employers agreed, at the request of the men's representatives, to postpone the lock-out for a fortnight, in order that a ballot of the men might be taken on the question of arbitration. At the meeting mentioned, which was largely attended by both shipyard and house joiners, this ballot was taken, and it was agreed by a small majority to submit to arbitration. The men also decided not to resume work until the award is made known.

LEGAL.

WEST-END ANCIENT LIGHT DISPUTE.

THE case of Stevens *v.* Collins came before Mr. Justice Walton in the Vacation Court on Wednesday, on a motion by the plaintiff for an interim injunction restraining the defendant until the trial, or further order, from building so as to obstruct the plaintiff's ancient lights.

Mr. Mulligan, K.C., for the plaintiff, said his client was the lessee of No. 37, South Molton-street, W., and the defendant was building on the opposite side of the street. The plaintiff's lights were admittedly ancient. The width of the street was about 40 ft. or 41 ft., and according to the plaintiff's case the old buildings on the site on which the defendant was now building were 39 ft. 9 in. high. According to the defendant's evidence, these old buildings were 42 ft. high. The defendant had already built to a height of 46 ft. facing the plaintiff's premises, and proposed to build to a height of at least 50 ft. The only excuse the defendant made for obstructing the plaintiff's light was that other buildings adjoining had been pulled down and were not, by reason of a street improvement, to be rebuilt, and therefore the plaintiff would have more lateral light than he had formerly, and should be contented. The learned counsel contended that that fact did not justify the defendant obstructing the plaintiff's ancient lights.

His Lordship said he thought there was recently a case argued in the House of Lords bearing on the subject.

Mr. Mulligan said that was the action against Mr. Colls.

Mr. Bramwell Davis, K.C., for the defendant, said that the only question for his Lordship now was what ought to be done before the trial. Certain very interesting questions might arise at the trial. It was difficult at this stage to say whether there would be any injury to the plaintiff or not. If the defendant's building was put up to the full height it would only depreciate the plaintiff's direct light about 3 deg. or 3½ deg., and by the improvement he had obtained a great amount of extra lateral light. Defendant's case would be that the plaintiff's claim was limited to damages, and that he could not have an injunction. The question was whether his Lordship ought to stop the defendant's building operations now. The building was within 3 ft. or 4 ft. of the top at the present moment.

Mr. Mulligan said he was willing that there should be no order on the motion if the defendant would give an undertaking that he would pull down anything he might build if ordered to do so at the trial.

Mr. Bramwell Davis: Yes, anything built from now, or anything that is held to be an infringement.

In the result, after some further discussion, the motion was ordered to stand till the trial, on the defendant undertaking to pull down any building erected after that day, if, and so far as, the Court might at the trial decide that the plaintiff was entitled to an injunction in respect thereof—the plaintiff to give the usual undertaking in damages, the costs of the motion to be costs in the action.

A RICHMOND BUILDING CASE.

IN the Vacation Court on Wednesday last, Mr. Justice Walton had before him the case of the London Property Investment Trust, Ltd., and the Corporation of Richmond and Gosling and Son, on the application of the London Property Investment Trust, Ltd., for an interim injunction restraining, until the trial, certain building operations by the defendants now in progress.

Counsel, in support of the application, stated that there were two sets of buildings in which the Corporation of Richmond were interested, and other building work which was complained of in which they were not interested at all. The defendants up to the present had not filed any affidavits; but the defendants Gosling and Son, the builders, were willing to give an undertaking over next motion day not to build higher on plots Nos. 3 and 4. The Corporation were willing to give an undertaking not to build on plots of ground in Gordon-square higher than the buildings were at the present moment. On these terms the motion would stand over for one week.

Order accordingly.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

19,817 of 1902.—F. JOTTRAND: *Soldering Irons.*

A soldering iron characterised by the fact that it is provided with an inner combustion chamber and that the combustion of a suitable gas takes place within this chamber under the action of a special supply of oxygen without direct contact between the flame and the outer air, for the purpose of obtaining as complete a utilisation as possible of the heat of the flame serving to heat the bit, and of preventing the presence of any flame outside the apparatus.

22,069 of 1902.—P. MACGREGOR (D. H. Lewis): *Shovels and the like Implements.*

In a shovel and the like implement, the forming of a double socket out of the metal of which the blade is made, of any one piece with the blade, such socket being so formed that the handle of the said shovel may be clipped by one part of the socket close to the blade, and also by another part, placed some distance further from the blade.

22,229 of 1902.—ANTOINE DIAT, called DIAZ: *Method of Glazing Windows and the like.*

A process of glazing windows, in which strips of asbestos are placed against the outer metallic sash, the panes of glass then placed in position against said strips, and secured in position by means of metallic stops.

598 of 1903.—J. BORGARS, jun.: *Chimney Top.*

This invention consists of a chimney top provided with a conical baffler whose body is bell-shaped, tapering in towards the centre and widening out against the top.

1,962 of 1903.—P. G. EMERY: *Window Blinds.*

A blind for windows, doors, and other openings, comprising a blind having a constant upward tendency, and characterised by having a hollow rod with squaring cords passing there through and attached to the casing of the window or other opening, and yielding clamping means carried by the blind between the ends of the rod for frictionally clamping one or both of the cords to hold the blind against its upward tendency.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

10,280 of 1903.—W. B. ROBINSON: *Damp-proof Coating or Paint.*

A damp-proof coating or paint composed of boiled linseed oil, mastic cement, and red oxide of iron mixed in suitable proportions, with or without the addition of colouring matter or matters.

13,557 of 1903.—J. CALLMANN ant R. BORMANN: *Liquid Soldering Composition.*

A liquid soft soldering composition consisting of a mixture of finely-pulverised soft soldering metal, such as tin or an equivalent alloy, triturated to a paste, a deoxidising agent, such as zinc chloride, and a thickening substance, such as cellulose, which will burn without leaving any residue.

21,759 of 1902.—J. W. MOSELEY and S. BROTH: *Chimney Pots and Ventilators.*

A chimney pot or the like with an upper portion producing an annular V edge adapted to cut the wind in all directions, and divert it upwards and downwards, and in such a way as to cause the diverted wind to act syphonically on the chimney.

21,795 of 1902.—G. P. WALLIS: *Machinery for the Manufacture of Artificial Stone Goods, such as Flags, Paving Stones, and the like.*

In apparatus for the manufacture of artificial stone slabs and the like, the combination with the press, of a pivot and bearing secured thereto, a beam adapted to revolve in the pivot round the said press, and a lifting device connected to said beam, whereby the made stone can be handled before it is set.

17,942 of 1902.—G. ALLAN: *Window Fittings.*

This invention relates to windows both sashes of which work in the ordinary way with ropes and weights, and consists in providing means for opening them inwards and building them when open.

22,197 of 1902.—G. D. INNES: *Curb Fenders for Tiled and Other Hearths.*

A curb fender made in three or more parts bolted or otherwise connected together so as to render the curb fender adjustable in length or projection, or both, to suit varying sizes of tiled or other hearths.

22,500 of 1902.—J. MELLOWES: *Roof Glazing.*

This invention consists in providing the sash-bars of glass roofs with grooved springs adapted to form gutters to catch and carry off the water of condensation.

24,974 of 1902.—A. BRYAN: *Tiles for the Floors of Filter Beds Used in Connexion with the Bacterial Treatment of Sewage and for Analogous Purposes.*

In tiles for use in connexion with the treatment of sewage, the filtration of the water and trade effluents, and for analogous purposes, providing or forming in one or both of the edges of the tile, a shallow recess or gap, or two or more shallow recesses or gaps separated by intervening projections, bearing studs or abutments, whereby, when a series of such tiles are placed in rows and edge to edge, drainage slots, openings or channels are provided between them.

2,011 of 1903.—J. CZERMAK and A. BUXBAUM: *Process of Manufacturing Artificial Marble.*

A process of manufacturing artificial marble by splashing or coating soft masses of damp and freshly prepared plaster of Paris, cement, and so on with liquid paints, the special features of which are that small portions of the soft mass are dipped separately into any of the variegated colouring liquids of different descriptions and contained in different receptacles, these portions thereupon being placed on a smooth surface, for instance a plate of glass, with irregular interspaces between them, said interspaces being afterwards filled up with soft masses of plaster of Paris or cement, which may be unstained, the whole mass then presses down, distributed and flattened with a lath or other suitable tool.

6,558 of 1903.—J. EVANS: *Chimney Pots and Ventilators for the Prevention of Down Draughts and Cure of Smoky Chimneys.*

This invention has reference more particularly to chimney pots and ventilators to stop the down draughts and prevent smoke nuisance, the object and effect of the present invention is to provide a chimney pot of the kind referred to that under no circumstances will allow a down draught, which sends smoke out of the wrong end of the chimney, by making them as large as the present invention will allow, and by removing almost all obstruction, in the interior of these chimney pots, and in all cases having the narrowest part inside these pots broader than the flue they have to cover, leaving an open and free course for the smoke or foul air to get away, at the same time having them as low as this invention will allow.

6,756 of 1903.—F. BELLCHAMBERS: *Cowl for the Prevention of Down Draughts in Chimneys and for Ventilating Shafts and the Like.*

A fixed cowl having four separate flues formed by four brackets or wings, fixed inside a cylindrical shaft which has louvre-openings at its lower

end between the said brackets, the whole working in conjunction with a shaft and cone or series of cones surmounted by a conical cap.

7,875 of 1903.—J. E. HOSKINS and A. C. HAYCOCK: *Door and Analogous Hinges.*

In a two-part detachable hinge the combination with the seperable flaps and the collared hinge-pin, which is fixed to the knuckle of the one flap and engages in a hole in the knuckle of the other flap, of a bearing socket such as found in the inner end of the one knuckle and having the collar of the fixed hinge located at the bottom thereof, and an annular and extending bearing dowel, surrounding the entrance to the axle whole and adapted to engage with the socket on the two parts of the hinge being brought together, said dowel being of such a depth that when its inner end bears on the hinge-pin collar within the said socket, it keeps the opposite ends or edges of the knuckles and flaps out of contact.

11,020 of 1903.—W. LUBBECKE: *Compressive and Tensile Bars for Bridges, Pillars, and Other Iron Structures.*

U or Z formed iron bars to form girders, having the middle part thicker than tht flanges and holes or recesses being provided at the ends. U or Z formed iron bars having the flanges situated at an obtuse or acute angle to the middle part.

12,635 of 1903.—A. JENKINS: *Window Sashes.*

The window constructed to open inwards for cleaning purposes the outer portion of the sliding frame moving in the ordinary grooves of window frame, the opening sashes being locked to sliding frame.

15,511 of 1903.—J. H. DIERKICKX: *Doors or Shutters.*

A door or shutter having diagonally divided panels in which one of said panels is pivotally suspended from the other panel, and the two panels are adapted to be rotated together about a common axis of rotation so that the opening and closing of the door are effected by means of a movement composed of an oscillation of one panel and an oscillation in the same direction of the two panels connected.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 27.—By THORNBORROW & Co. (at Ulverston).

Hawkshead, Lancs.—Holmeshead and Miresike Farms, 279 a. 0 r. 39 p., f. £3,380

Blawith, Lancs.—Appletreeholm Farm, 40 a. 0 r. 25 p., f. 895

Hawkshead, Lancs.—Linstey Hall Wood and Coppice, 10 a. 2 r. 21 p., f. 155

Torver, Lancs.—Knapping Tree or Harrison Coppice, 10 a. 2 r. 21 p., f. 255

By WM. DEW & SON (at Llangefni).

Llaneugrad, etc., Anglesey.—The outlying portions of the Trescawen Estate, comprising farms, tenements, and cottages, 154 a. 1 r. 29 p., f. (in lots) 6,914

August 31.—By PROTHEROE & MORRIS (on estate).

Newhaven, Sussex.—Mount Pleasant Estate, 58 freehold plots; an enclosure of grass-land, 9 acres; also a cottage (in lots) 1,367

September 1.—By H. J. WAY & SON (at Newport).

Newport, Isle of Wight.—78 and 79, Trafalgar-rd., f., yr. 26*l* 330

32, South Mall-st., f., w.r. 7*l* 16*s* 115

36 and 37, Chapel-st., f., y.r. 26*l* 436

6 to 9, Royal Exchange, u.t. 942 yrs., g.r. 2*l* 9*s*. w.r. 29*l* 18*s* 205

Carisbrooke, Isle of Wight.—Gunville, two freehold houses, area 0 a. 2 r. 15 p. y.r. 13*l* 140

By TABERNACLE & SON (at Masons' Hall Tavern).

Tilbury, Essex.—The World's End p.h., area 4 a. 0 r. 15 p., u.t. 47 yrs., g.r. 50*l*., with goodwill 3,300

September 2.—By E. J. CARTER.

Tunbridge Wells, Kent.—Bishops Down Pk., Warberry House, and 3 acres, f., p. 4,000

September 3—By HATCH & HATCH (at Catford).

Catford.—59, 61, and 63, Rosenthal-rd., u.t. 94½ yrs., g.r. 18*l* 18*s*., y.r. 76*l* 1,030

165, 167, and 169, Laleham-rd., u.t. 94½ yrs., g.r., 16*l* 10*s*., w.r. 128*l* 14*s* 950

122, Laleham-rd., u.t. 94½ yrs., g.r. 5*l* 5*s*., y.r. 30*l* 315

Davenport-rd., Homedale, f., p. 1,100

82a to e, 85 to 131 (odd), 86 to 130 (even), and 134, Farley-rd., u.t. 94½ yrs., g.r. 278*l*. 5*s*., w.r. 1,989*l*. 12,710

136 Farley-rd., u.t. 94½ yrs., g.r. 4*l*, w.r. 37*l* 14*s*. 270

113 to 119 (odd), 133 and 135, Davenport-rd., u.t. 94½ yrs., g.r. 30*l*., w.r. 226*l*. 4*s*. 1,545

64 to 74 (even), Davenport-rd., u.t. 94½ yrs., g.r. 30*l*., w.r. 226*l*. 4*s*. 1,500

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 15 6	per 1,000 alongside, in river.
Rough Stocks and Grizzles.....	1 12 6	" " "
Facing Stocks....	2 12 0	" " "
Shippers	2 5 0	" " "
Flettons	1 8 6	" at railway depôt
Red Wire Cuts ..	1 12 6	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire ..	4 5 0	" " "
Do. Bullnose	4 11 0	" " "
Best Stourbridge Fire Bricks	4 8 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers.....	13 0 0	" " "
Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	17 0 0	" " "
Double Stretchers	19 0 0	" " "
Double Headers..	16 0 0	" " "
One Side and two Ends.....	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamfered, Squints.....	20 0 0	" " "
Best Dipped Salt Glazed Stretchers and Headers	12 0 0	" " "
Quoins, Bullnose, and Flats.....	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers..	14 0 0	" " "
One Side and two Ends.....	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays Chamfered, Squints.....	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best

	s. d.	
Thames and Pit Sand	6 0	per yard, delivered
Thames Ballast	6 0	" "
Best Portland Cement	30 0	per ton, delivered.
Best Ground Blue Lias Lime..	20 6	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s 6d. per yard, delivered.
Stourbridge Fire-clay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington depot, Nine Elms depot, or PimlicoWharf	2 1	" "
White Basebed, delivered on road waggons, Paddington depot, Nine Elms depot, or Pimlico Wharf....	2 2½	" "

	s. d.	
Ancaster in blocks	1 12	per ft. cube, deld rly. depôt
Beer in blocks	1 6	" "
Grinshill "	1 10	" "
Darley Dale in blocks..	2 4	" "
Red Corsehill "	2 5	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "

YORK STONE—*Robin Hood Quality.*

	s. d.	
Scappled random blocks	2 10	per ft. cube, deld. rly. depôt.
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per foot super.
6 in. Rubbed two sides Ditto, Ditto	2 6	" "
3 in. Sawn two sides slabs (random sizes)..	0 11½	" "
2 in. to 2½ in. Sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
Scappled random blocks	3 0	per ft. cube "
6 in. sawn two sides, landings to sizes(under 40 ft. sup.).....	2 8	per ft. super. "
6 in. Rubbed two sides Ditto	—	" "
3 in. sawn two sides slabs (random sizes)	1 9	" "
2 in. self-faced random flags.....	0 5	" "
Hopton Wood (Hard Bed) in blocks	2 3	per ft. cube.
" " " 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt
" " 3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.	
20×12 best blue Bangor..	13 2 6	per 1000 or 1200 at rly. dep.
20×12 " " "	13 17 6	" "
20×10 best seconds "	12 15 0	" "
20×12 " " "	13 10 0	" "
16×8 best "	7 0 0	" "
20×10 best blue Portmadoc ..	12 5 0	" "
16×8 best blue Portmadoc	6 5 0	" "
20×10 best Eureka unfading green....	15 2 6	" "

PRICES CURRENT (*Continued*).

SLATES.

in. in.	£ s. d.	
20×12 best Eureka unfading green....	17 2 6	per 1000 or 1200 at rly.dept.
18×10 " "	12 10 0	" "
16×8 " "	10 5 0	" "
20×10 permanent green	11 0 0	" "
18×10 " "	9 5 0	" "
16×8 " "	6 10 0	" "

TILES.

	s. d.	
Best plain red roofing tiles...	42 0	per 1,000, at rly. depôt.
Hip and valley tiles....	3 7	per doz.
Best Broseley tiles	50 0	per 1,000
Do. Ornamental Tiles	52 6	" "
Hip and valley tiles....	4 0	per doz.
Best Ruabon Red, brown or brindled Do. (Edwards)	57 6	per 1,000
Do. ornamental Do.	60 0	" "
Hip tiles	4 0	per doz.
Valley tiles.....	3 0	" "
Best Red or Mottled Staffordshire Do. (Peakes)	51 0	per 1,000
Do. Ornamental Do.	54 6	" "
Hip tiles	4 1	per doz.
Valley tiles.....	3 8	" "
Best "Rosemary" brand plain tiles	48 0	per 1,000
Do. Ornamental Do.	50 0	" "
Hip tiles	4 0	per doz.
Valley tiles	3 8	" "

WOOD.

	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.....	15 10 0	16 10 0
Deals: best 3 by 9.....	14 10 0	15 10 0
Battens: best 2½ in. by 7 in. and 3 in., and 3 in. by 7 in. and 3 in.....	11 10 0	12 10 0
Battens: best 2½ by 6 and 3 by 6 ..	0 10 0	less than 7 in. and 3 in.
Deals: seconds	1 0 0	less than best
Battens: seconds	0 10 0	" " "
2 in. by 4 in. and 2 in. by 6 in. ..	9 0 0	9 10 0
2 in. by 4½ in. and 2 in. by 5 in. ..	8 10 0	9 10 0
Foreign Sawn Boards—		
1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	"
Fir timber: Best middling Dantzig or Memel (average specification	At per load of 50 ft. 4 10 0	5 0 0
Seconds	4 5 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.).....	3 0 0	3 10 0
Swedish balks	2 15 0	3 0 0
Pinch-pine timber (70 ft. average)..	3 5 0	3 15 0

JOINERS' WOOD.

	At per standard.	
White Sea: First yellow deals, 3 in. by 11 in.....	23 0 0	24 0 0
3 in. by 9 in.	21 0 0	22 10 0
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0
Second yellow deals, 3 in. by 11 in.	18 15 0	20 0 0
" " 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.....	18 0 0	19 10 0
Battens.....	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.....	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens.....	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.....	13 10 0	14 0 0
Do. 3 in. by 9 in.	13 0 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:—		
First white deals, 3 in. by 11 in.	14 10 0	15 10 0
" " 3 in. by 9 in.	13 10 0	14 10 0
Battens.....	11 0 0	12 0 0
Second white deals 3 in. by 11 in.	13 10 0	14 10 0
" " 3 in. by 9 in.	12 10 0	13 in.
" " battens.....	9 10 0	10 10 0
Pitch-pine: deals	16 0 0	18 0 0
Under 2 in. thick extra	0 10 0	1 0 0
Yellow Pine—First, regular sizes ...	33 0 0	upwards.
Oddments	22 0 0	24 0 0
Seconds, regular sizes	24 10 0	26 10 0
Yellow Pine Oddments	20 0 0	22 0 0
Kauri Pine—Planks, per ft. cube..	0 3 6	0 4 6
Dantzig and Stettin Oak Logs—		
Large, per ft. cube	0 2 6	0 3 6
Small " "	0 2 3	0 2 6
Wainscot Oak Logs, per ft. cube ..	0 3 0	0 3 6
Dry Wainscot Oak, per ft. sup. as		
inch	0 0 7	0 0 8
¾ in. do. do.	0 0 4½	- - -
Dry Mahogany—Honduras, Tabasco, per ft. sup. as inch	0 0 5	0 0 11
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 0
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 2
Teak, per load	17 0 0	22 0 0
American Whitewood Planks—		
Per ft. cube	0 4 0	- -

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot.....	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched.....	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched.....	0 16 0	1 1 6
1 in. by 7 in. white, planed and shot.....	0 11 6	0 13 6
1 in. by 7 in. white, planed and matched.....	0 12 0	0 14 0
1¼ in. by 7 in. white, planed and matched.....	0 14 6	0 16 6
¾ in. by 7 inch yellow matched and beaded or V-jointed boards	0 11 0	0 13 6
1 in. by 7 in. do. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 12 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6-in. at 6d. to 9d. per square less than 7-in.

[*See also page 283.*

COMPETITIONS, CONTRACTS AND PUBLIC APPOINTMENTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered
•Designs for a Free Public Library	Borough of Tamworth	20*l.*, 10*l.*, 5*l.*	Nov. 14

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c., supplied by	Tenders to be delivered
Cottages	Lunavady (Ireland) R.D.C.	W. Crawford, Council Offices, Lunavady	Sep. 14
Additions to Schools, Barkerend	Bradford School Board	J. Garbutt, Manor-row, Bradford	Sep. 15
Two Houses, Aspatria, Cumberland	.....	Surveyor, 45, Lawson-street, Aspatria	do.
C.I. Pipes	Chorley (Lancs) Corporation	J. W. Allin, Gas Engineer, Chorley	do.
C.I. Pipes	Rochdale Corporation	J. Leach, Town Hall, Rochdale	do.
Sinking Pit, Bank Hall Colliery, Burnley	Exors. of Colonel Hargreaves	Manager, Bank Hall Colliery Offices, Burnley	do.
Police Station, Ascot	Berkshire Standing Jt. Committee	J. Morris, County Surveyor, Broadway-buildings, Reading	do.
Sewage Disposal Works, Kyo	Annfield Plain (Durham) U.D.C.	T. J. Trowsdale, Surveyor, Council Offices, Annfield Plain	do.
Road Metal (one year)	Wilton (Wilts) R.D.C.	G. M. Wilson, 12, Bridge-street, Salisbury	do.
Paving Works (four contracts)	Merthyr Tydfil U.D.C.	T. A. Rees, Town Hall, Merthyr Tydfil	do.
Paving Works, Lansdowne-terrace, &c., North Shields	Tynemouth Corporation	J. F. Smillie, Borough Surveyor, Tynemouth	do.
Two Cottages, Irthlingborough Grange	Wellingborough U.D.C.	J. E. H. de Key, Surveyor, Park-road, Wellingborough	do.
Public Washhouses, Pryme-street, Hulme	Manchester Corporation	City Architect, Town Hall, Manchester	do.
Shed, &c., at Foundry, Albert-road, Halifax	.....	Jackson & Fox, Architects, 7, Rawson-street, Halifax	do.
Shop, Anlaby-road, Hull	N.E.R. Co.	W. Bell, Architect, Paragon Station, Hull	Sep. 16
Greenhouse and Pavilion, Woodvale and Falls Park	Belfast Corporation	Sir S. Black, Town Hall, Belfast	do.
Two Cottages, Mersea-road, Colchester	.....	J. W. Start, Architect, Colchester	do.
Conveniences, West-lane and Leeds-street	Keighley Corporation	W. H. Hopkinson, C.E., Keighley	do.
Additions to Store Premises, Kirby-in-Furness	.....	Newby, Architect, Cartmel	do.
Five Cottages, &c.	Kinsale (Ireland) R.D.C.	R. Evans, Surveyor, 53, South Mall, Cork	do.
Renewing Farm Steading, Ardmeddan, nr. Aldmeldrum	.....	W. Clark, Architect, Methlick	do.
Drainage Works, Loughlinstown, Ireland	Rathdown Guardians	P. F. Comyer, C.E., Union Offices, Loughlinstown	do.
Schools, Simthies, near Barnsley	Wesleyan Reform Trustees	Wade & Turner, Architects, 10, Pitt-street, Barnsley	do.
Asphalt Paving	Trowbridge U.D.C.	H. G. Nicholson-Lailey, Surveyor, Town Hall, Trowbridge	do.
Road Metal, Stow Hill	Newport (Mon) Guardians	T. Thomas, Queen's Hill, Newport Mon.	do.
Additions to Schools, Coedybrain, Llanbradach	Eglwysilan School Board	J. H. Phillips, Architect, Windsor-place, Cardiff	do.
Sanitary Works at Dispensary, Claire	Naas (Ireland) Guardians	D. J. Purcell, Boardroom Workhouse, Naas	do.
Additions to Schools, Church-street, Banbridge, Ireland	Select Vestry of Parish Church	W. W. Larmor, C.E., Banbridge	do.
Station Buildings, Hessle, Ferriby, and Brough	N.E.R. Co.	W. Bell, Architect, Railway Offices, Hull	do.
Library, Cromwell-grove and Barlow-road	Levenshulme U.D.C.	J. Jepson, Architect, Guardian Chambers, Tiviot Dale, Stockport	do.
Street Works, Patterson-street and others, Earlestown	Newton-in-Makerfield U.D.C.	C. Cole, Town Hall, Earlestown	do.
Sewers, Cemetery-road	Carlton (Notts) U.D.C.	R. Whitbread, Surveyor, Station-road, Carlton	do.
•Destructor Buildings, &c., at Sewage Farm	Epsom U.D.C.	Council's Surveyor, Bromley Hurst, Church-street, Epsom	Sep. 17
Additions to Farm Buildings, The Glebe, Ermington	.....	Adams & Son, Plympton	do.
C.I. Pipes (900 tons)	Birmingham Corporation	J. D. Watson, Engineer, Tyburn, near Birmingham	do.
Granite Road Metal (broken, 1,500 tons)	Felixstowe U.D.C.	S. E. Fisher, Surveyor, Town Hall, Felixstowe	do.
Road Works, Wood-street and others, Wallington	Croydon R.D.C.	R. M. Chart, Surveyor, Town Hall, Croydon	do.
Sewers, &c., Essington, Staffs	Cannock R.D.C.	H. M. Whitehead, Surveyor, Pankridge, Stafford	do.
Sewerage Works	Lichfield R.D.C.	W. E. Rogers, Engineer, Rugeley	do.
Chapel, Nantyfyllen, Maesteg, Wales	.....	Rev. H. S. Thomas, Garnwern Terrace, Nantyfyllen	do.
Bacteria Beds	Devizes U.D.C.	Beesley, Son & Nichols, Engineers, 11, Victoria-st., Westminster, S.W.	do.
Road Metal	East Barnet Valley U.D.C.	H. York, Civil Engineer, Station-road, New Barnet	do.
Road Works	Ashford (Kent) U.D.C.	W. Terrill, Surveyor, 5, North-street, Ashford	Sep. 18
Sewerage Works, &c., Dringhouses	Bishopsthorpe (Yorks) R.D.C.	Fairbank & Sons, Civil Engineers, Lendal, York	do.
Bridge Works, &c., Worthing, Norfolk	Mitford and Launditch, R.D.C.	W. M. Barton, Guildhall, East Dereham	Sep. 19
Rebuilding Shops, Aberaman	Crombach Co-operative Society, Ld.	T. Roderick, Architect, Aberdare	do.
Main Drainage Works (Contract No. 2)	Harrogate Corporation	E. W. Dixon, Civil Engineer, Town Hall, Harrogate	do.
Broken Granite Road Metal (2,500 tons)	Tamworth R.D.C.	H. J. Clarkson, Surveyor, 22, Church-street, Tamworth	do.
Sewerage Works, Carperby, Yorks	Aysgarth R.D.C.	Rodwell & Sons, Surveyors, West Witton, Leyburn, R.S.O.	do.
Sewers, &c., Priests-lane, Shenfield	Billericay R.D.C.	F. H. Jones, Engineer, Parliament Mansions, Victoria-street, S.W.	do.
Additions to Stables, &c.	Scarborough Town Council	Borough Engineer, Town Hall, Scarborough	do.
Broken Granite (2,500 tons)	Tamworth R.D.C.	H. J. Clarkson, Surveyor, 22, Church-street, Tamworth	do.
Drainage Works, Harrogate	.....	E. W. Dixon, 5, Prospect-crescent, Harrogate	do.
Greenhouse, Quay-road	Bridlington Corporation	E. R. Matthews, Civil Engineer, Town Hall, Bridlington	do.
Public Convenience, Crane Wharf	do.	do.	do.
Bridge Works, and Retaining Wall, Clough Bridge-rd.	do.	do.	do.
Schools, Marton-road	Middlesborough Corporation	J. M. Bottomley & Son, Architects, 28, Albert-road, Middlesborough	Sep. 21
Public Library	Motherwell Town Council	Greig & Co., Architects, Edinburgh	do.
Rebuilding House, Butcher-row, Ratcliff, Stepney, E.	Messrs J. Symons & Co., Ltd.	C. Dunch, Architect, St. Clement's House, Lombard street, E.C.	do.
Engine House, &c. at County Asylum, Knowles, Fareh'm	Committee	W. J. Taylor, County Surveyor, The Castle, Winchester	do.
Reservoir, White Loch, Mearns	Stewarton (N.B.) Town Council	W. R. Copland, Civil Engineer, 146, West Regent-street, Glasgow	do.
Street Works, North Bank-road, &c.	Batley Town Council	O. J. Kirby, Surveyor, Branch-road, Batley, Yorks	do.
Sewers, &c., Back-street, and Other Roads	Billericay (Essex) R.D.C.	R. J. W. Layland, Surveyor, Billericay	do.
Sewerage Works, Billing-road	Northampton Corporation	A. Fidler, Civil Engineer, Guildhall, Northampton	do.
Broken Granite	Newhaven (Sussex) U.D.C.	E. Knightley, Council's Offices, Newhaven	do.
Manse, King Edward-street, Fraserburgh, N.B.	West U.F. Church	W. Wilson, Architect, Frithside-street, Fraserburgh	Sep. 22
•New Sorting Office, Muswell Hill, N.	Commissioners of H.M. Works, &c.	J. Wager, H.M. Office of Works, Storey's Gate, S.W.	do.
Additions to Laundry at Hospital, Poulton	Dover Town Council	H. E. Stilgoe, Civil Engineer, Biggin-street, Dover	do.
•Road-making and Paving Works	Willesden District Council	Council's Engineer, Dyne-road, Kilburn, N.W.	do.
Cast-iron (Contract 1) 271 tons	Irthlingborough (Northants) U.D.C.	J. Waugh, Civil Engineer, Sunbridge Chambers, Bradford	do.
Sewage Works	Denbigh Corporation	Bailey, Denton, & Co., Civil Engineers, Palmer Chbrs., Westminster	do.
Road Works, Lytchet Minster, Dorset	Sir Elliott Lees	R. T. S. Seymour, Surveyor, Wimborne	do.
*Floor over Swimming Bath, Wandsworth	Wandsworth Borough Council	Council's Surveyor, High-street, Wandsworth, S.W.	do.
*Paving Works	Hammersmith Council	Borough Surveyor, Town Hall, Hammersmith	Sep. 23
*Sewerage Works	Sevenoaks R.D.C.	T. Hennell, Engineer, 6, Delahay-street, Westminster, S.W.	do.
Sewerage Works, Sutton-on-the-Forest, Yorks	Easingwold R.D.C.	Fairbank & Sons, Civil Engineers, Lendal, York	do.
Schools, Oldknow-road, near Small Heath	Birmingham Education Committee	A. Rowse, Surveyor, 3, Newhall-street, Birmingham	do.
Columnar Basalt (14,000 tons)	Blackpool Corporation	J. S. Brodie, Borough Surveyor, Town Hall, Blackpool	do.
*Alterations, Repairs, &c., Southfield House, Dartford	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
Street Works, North Bank-road	Batley (Yorks) Town Council	C. J. Kirby, Architect, Branch-street, Batley	Sep. 24
*Sewage Disposal Scheme, Wymington	Bedford R.D.C.	The Clerk, 1, Harpur-street, Bedford	do.
*Sundry Works to Infirmary, Old Gravel-lane	St. George-in-the-East Guardians	Guardians' Offices, Raine-street, Old Gravel-lane, E.	Sep. 25
Stone Wall, Gates, &c., at Cemetery	Radcliffe (Lancs) U.D.C.	W. L. Rothwell, Surveyor, Council Offices, Radcliffe	Sep. 26
Works, &c., Mile Cross, Halifax	Mr. Chas. Horner	Walsh & Graham, Architects, Museum Chambers, Halifax	Sep. 29
Drainage Works at Workhouse	Buntingford (Herts) Guardians	E. G. Thody, Surveyor, High-street, Buntingford	do.
*New Sorting Office, Ealing Dean	H.M. Office of Works	J. Wager, H.M. Office of Works, Storey's Gate	do.
•Ealing Telephone Exchange	do.	do.	do.
Drainage Works, Formby (Lancs)	West Lancashire R.D.C.	C. A. Atkinson, Engineer, 11, Tithebarn-street, Liverpool	Sep. 30
Office, Store, &c., Gouthwaite Lodge, nr. Pateley Bridge	Bradford Corporation	J. Watson, Civil Engineer, Town Hall, Bradford	Oct. 1
Reservoirs, &c.	do.	do.	do.
Masonry Dams, &c., Angram	do.	do.	do.
*Central Public Library, Barry	Barry U.D.C.	Hutchinson & Payne, Architects, 11, John-street, Bedford-row, W.C.	Oct. 2
•New Coast Guard Buildings, Isles of Scilly	Admiralty	Superintending Civil Engineer, H.M. Dockyard, Devonport	do.
*Repairing, &c. Bidings., Abbey Mills Pumping Station	London County Council	Engineer's Department, County Hall, Spring Gardens, S.W.	Oct. 6
*Underground Convenience in Falcon-square	Corporation of London	Office of the Engineer, Public Health Department, Guildhall, E.C.	do.
*Underground Convenience, St. Martin's-le-Grand	do.	Engineer, Public Health Department, Guildhall, E.C.	do.
*Erection of Lodges, South Park, Fulham	Fulham Borough Council	Borough Engineer, Town Hall, Fulham, S.W.	Oct. 7
*Alterations to Cider Stores, &c., Stepney	John Symons & Co., Ltd.	C. Dunch, Architect, Clements-lane, Lombard-street, E.C.	No date.
Sinking Shaft, Gorseinon, near Swansea	.....	D. W. A. Saunders, Civil Engineer, Worcester Chambers, Swansea	do.
Public Library, Lake-road, Branksome, Dorset	.....	S. J. Newman, Architect, Branksome, Parkstone, Dorset	do.
Additions to Bridge End Inn, Pontnewydd	Messrs. W. Handcock & Co.	N. M. Brown, Architect, Dock-street, Newport, Mon.	do.
Additions to Premises, 8, Prices-street, Truro	Mr. O. Blackford	S. Trevail, Architect, Truro	do.
Additions to House, Shadwell-lane, Moortown, Leeds	.....	—. Mosleys, 6, Wormald-row, Leeds	do.
Shops and Flats, Uxbridge-road, Shepherd's Bush	.....	Palgrave & Co., Architects, 28, Victoria-street, S.W.	do.

[See also next page.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Foremen Carpenters	Govt. of S'thern. Nigeria, W. Africa	20l. per month	Sep. 21
*Borough Surveyor	Bethnal Green Council	350l.	Sep. 25
*Additional Manual Training Instructors in Woodwork	School Board for London	See Advertisement	Sep. 26
*Civil Engineering Draughtsman	Admiralty	Not stated	No date.
*Architectural Draughtsman	do.	do.	do.

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. & x. *Public Appointments*, xvii.

PRICES CURRENT (*Continued*).

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	7 5 0
Compound Girders ,, ,,	8 2 6	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	8 17 6
Flitch Plates	8 5 0	8 15 0
Cast Iron Columns and Stanchions, including ordinary patterns	7 2 6	8 5 6

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON—		
Common Bars	7 10 0	8 0 0
Staffordshire Crown Bars, good merchant quality	8 0 0	8 10 0
Staffordshire "Marked Bars"	10 10 0	. . .
Mild Steel Bars	8 15 0	9 5 0
Hoop Iron, basis price	9 0 0	9 5 0
,, ,, galvanised	16 0 0	. .
(* And upwards, according to size and gauge.)		
Sheet Iron, Black.—		
Ordinary sizes to 20 g.	9 15 0	. . .
,, ,, to 24 g.	10 15 0	. . .
,, ,, to 26 g.	12 5 0	. . .
Sheet Iron, Galvanised, flat, ordinary quality—		
Ordinary sizes 6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.	14 5 0	. . .
Sheet Iron, Galvanised, flat, best quality:—		
Ordinary sizes to 20 g.	15 0 0	. . .
,, ,, 22 g. and 24 g.	15 10 0	. . .
,, ,, 26 g.	13 0 0	. . .
Galvanised Corrugated Sheets:—		
Ordinary sizes, 6 ft. to 8 ft. 20 g.	12 15 0	. . .
,, ,, 22 g. and 24 g.	13 5 0	. . .
,, ,, 26 g.	14 0 0	. . .
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	. . .
,, ,, 22 g. and 24 g.	12 15 0	. . .
,, ,, 26 g.	14 0 0	. . .
Cut nails, 3 in. to 6 in.	9 5 0	9 15 0
(Under 3 in. usual trade extras.)		

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3 lbs. & up.	14 0 0	. . .
Pipe in coils	14 10 0	. . .
Soil pipe	17 0 0	. . .
Compo Pipe	17 0 0	. . .
ZINC—Sheet—		
Vieille Montagne ton	26 0 0	. . .
Silesian	25 15 0	. . .
COPPER—		
Strong Sheet per lb.	0 0 10½	. . .
Thin ,,	0 0 11½	. . .
Copper nails ,,	0 0 11	. . .
BRASS—		
Strong Sheet per lb.	0 0 10	. . .
Thin ,, ,,	0 0 11	. . .
TIN—English Ingots ,,	0 1 4	. . .
SOLDER—Plumbers' ,,	0 0 6	. . .
Tinmen's ,,	0 0 5	. . .
Blowpipe ,,	0 0 9	. . .

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
,, fourths	1¾d. ,, ,,
21 oz. thirds	3½d. ,, ,,
,, fourths	2½d. ,, ,,
26 oz. thirds	3¾d. ,, ,,
,, fourths	3¼d. ,, ,,
32 oz. thirds	4¼d. ,, ,,
,, fourths	4¼d. ,, ,,
Fluted sheet, 15 oz.	2¾d. ,, ,,
,, 21 oz.	3¼d. ,, ,,
¼ Hartley's Rolled Plate	1¾d. ,, ,,
⅓ ,, ,, ,,	2d. ,, ,,
½ ,, ,, ,,	2¼d. ,, ,,

OILS, &c.

	£ s. d.
Raw Linseed Oil in pipes or barrels.. per gallon	0 1 10
,, ,, ,, in drums ,,	0 2 2
Boiled ,, ,, in pipes or barrels.. ,,	0 2 1
,, ,, ,, in drums ,,	0 2 5
Turpentine, in barrels ,,	0 3 7
,, in drums ,,	0 3 9
Genuine Ground English White Lead per ton	19 10 0
Red Lead, Dry ,,	19 10 0
Best Linseed Oil Putty per cwt.	0 8 0
Stockholm Tar per barrel	1 19 0

PRICES CURRENT (*Continued*).

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for Seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

THE INDEX (with TITLE-PAGE) for VOLUME LXXXIV. (January to June, 1903) was given as a supplement with the number for July 11.

CLOTH CASES for Binding the Numbers are now ready, price 1s. 9d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-FOURTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 2s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, &c. &c.

Six lines, or under ..... 6s. 0d.
Each additional line ..... 1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

FOUR lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps must not be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE noon on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder" may have *Replies addressed to the Office*, Catherine-street, Covent Garden, W.C. *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { SIXPENCE EACH. By Post (carefully packed) 1s.

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

TERMS OF SUBSCRIPTION.

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TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under 100l., unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ABERBEEG.—For the erection of 20 houses, for the building club. Mr. P. Vivian Jones, architect, Hengoed:—

D. Lewis, Aberbeg* ..... £4,280.

BASFORD (Notts.).—For the execution of road works, Newthorpe, for the Rural District Council. Mr. G. W. Hawley, Surveyor, York-chambers, King-Street, Nottingham:—

Thraves & Son	£196 14 0
S. Richmond	164 5 10
Cope & Raynor, Lenton, Nottingham*	154 2 5

DARENTH ASYLUM.—For cleaning and painting work at the Darenth Asylum, for the Metropolitan Asylums Board:—

T. Carr	£8,700	Vigor & Co.	£4,765 0 0
W. C. Collingwood	7,500	M. Batchelor	4,580 0 0
Gardner & Hazell	7,235	T. Cole	4,459 0 0
R. McCarthy	5,891	Titmas & Sons	4,333 0 0
Munn & Son	5,727	Proctor & Sons	3,775 0 0
Page, Ltd.	5,670	E. G. Rogers	2,994 12 9
J. Lonsdale	5,490	P. McCarthy	2,977 0 0
Wollaston & Co.	5,183	A. H. Innes*	2,841 9 0
Enness Bros.	4,844		

[Engineer's estimate ..... £3,450.]

DEWSBURY.—For the supply of broken granite for the Soothill Nether Urban District Council. M. J. H. Ward, Surveyor, Earlsheaton, Dewsbury:—

For Clife Hill.

	s. d.
Thos. Feather*	12 2

For Ingleton.

Leonard Cooper*	10 1

EPSOM.—For the erection of new depot, &c., Church-street, for the Urban District Council. Mr. E. R. Capon, Town Surveyor, Bromley Hurst, Epsom:—

W. Roberts	£4,579	Ferguson & Co.	3,700
Higgs & Outhwaite	4,250	R. Atkinson	3,700
Cropley Bros.	4,094	Roll & Taylor	3,650
M. G. King	3,923	Willmott & Son	3,636
Rowland Bros.	3,904	Jones & Son	3,630
R. Wood	3,900	Stewart & Son	3,608
Foster Bros.	3,887	F. J. Shopland	3,580
Akers & Co.	3,837	Smith & Sons, Croydon*	3,550
C. Jackson	3,745		

Farm Buildings.

W. Roberts	£879 0 0	C. Jackson	£572 0 0
Higgs & Outhwaite	668 0 0	Foster Bros.	564 0 0
Ferguson & Co.	613 0 0	Stewart & Son	562 0 0
Cropley Bros.	612 0 0	Jones & Son	550 0 0
R. Wood	590 0 0	F. J. Shopland	547 0 0
Willmott & Son	580 0 0	Roll & Taylor	545 0 0
Akers & Co.	579 0 0	Smith & Sons	543 0 0
Rowland Bros.	578 0 0	R. Atkinson	540 0 0
		M. G. King*	531 10 11

Post-Mortem Room.

W. Roberts	£559 0 0	Higgs & Outhwaite	£498 0 0
R. Atkinson	533 0 0	Akers & Co.	494 0 0
Cropley Bros.	533 0 0	Rowland Bros.	490 0 0
M. G. King	525 6 5	Smith & Son	475 0 0
Foster Bros.	524 0 0	Stewart & Sons	470 0 0
Ferguson & Co.	506 0 0	Jones & Son	470 0 0
Willmott & Son	505 0 0	F. J. Shopland	467 0 0
R. Wood	500 0 0	Roll & Taylor*	465 0 0
C. Jackson	499 0 0		

Surveyor's Estimates.

Depot	£4,276
Farm Stables	550
Post Mortem Room	426

[*See also next page.*

FOUNTAIN HOSPITAL.—For the execution of fire-resisting works, alterations, and additions to Fountain Hospital, for the Metropolitan Asylums Board. Messrs. Aldwinckle & Son, architects:—

Ferguson & Co.	£15,300	Johnson & Co., Ltd.	£13,450
Lawrence & Son	14,392	E. Chamberlain	13,050
Wall & Co.	14,049	Roberts & Co. Redhill*	12,950
F. & H. F. Higgs	13,800		

[Architect's estimate £15,400.]

GRIMSBY.—Accepted for the erection of an underground station at the electricity works, Doughty-road, for the Corporation. Mr. W. A. Vignoles, M.I.E.E., Grimsby:—

Hewins & Goodhand, Grimsby £589

HIGHAM'S PARK.—For U. M. F. School Church, Higham's Park, E. Messrs. George Barnes & Sons, Architect, 5, Clement's Inn, Strand, W.C. The following tenders have been received for the above:—

Gough & Co.	£2,364	Battley, Sons & Holness	£2,097
C. North	2,318	Sands, Palmer & Co., Walthamstow*	1,990
S. J. Scott	2,220		
Mattock Bros.	2,200		
F. J. Coxhead	2,139		

HORNCASTLE (Lincs.).—For rebuilding a bridge, Asterby, for the Rural District Council. Mr. W. H. Holmes, Surveyor, 4, Church-lane, Horncastle:—

Burman	£201 17
Hensman & Son	153 0
Miller, Minting*	128 0

INGATESTONE (Essex).—For additions and alterations to the malting, for M. Quinn, Esq. Messrs. Clare and Ross, architects, 1, West-street, London, E.C., and Westcliff-on-Sea:—

Smith & Sons	£265
Johnson, Chelmsford*	198

KELLING (near Holt, Norfolk).—For the erection of a doctor's house and lodge for the Kelling Sanatorium Committee. Messrs. Clare & Rose, architects, London and Westcliff-on-Sea:—

Blyth, Norfolk* (house)	£619
Blyth, Norfolk‡ (house)	241

‡ Deferred.

KELLING (near Holt, Norfolk).—For the erection of a new 12 bed pavilion at the Consumptive Sanatorium for the Building Committee. Messrs. Clare & Ross, architects, London and Westcliff-on-Sea:—

Blyth, Norfolk*	£591 13 6

For a second 12 bed pavilion.

Blyth, Norfolk*	£617 3 0

LYNTON (Devon).—For the execution of water-supply works, for the Urban District Council. Mr. W. H. Chowins, engineer, Town Hall, Lynton:—

Rafarel & Co.	£3,237 8 8	B. Jones	£2,331 12 10
F. Mills	2,953 11 0	G. L. Gunn, Lynton*	2,235 7 10
R. Neal	2,505 0 0		

MACCLESFIELD.—For the erection of a provision shop, for the Equitable Provident Society, Ltd. Mr. Jabez Wright, architect, Macclesfield:—

Gorton & Wilson	£1,240 0	J. Clayton	£1,045 0
Roylance & Co., Ltd.	1,170 0	J. Dakin	1,031 0
E. & A. Frith	1,070 0	Cooke & Sons, Burton-road*	999 15

NORBURY.—For the erection of six houses, Fairview Road.

C. Whillier	£2,100 ‡
Sims & Wood	2,040
J. Wright Hallett*	2,040 ‡

PAKEFIELD.—For the erection of Rectory House.

Sims & Wood*	£2,150

TEDDINGTON.—For the erection of a detached villa, Broom-road, for Mr. T. Bailey:—

R. Ferris	£749 0	E. Cooper	£650 0
Tolton	700 0	E. Seeber	650 0
C. A. Drake	700 0	F. Child*	562 10

TOOTING BEC.—For wiring, for electric light, the children's home at the Tooting Bec Asylum for the Metropolitan Asylums Boards:—

Hayman, Tyler & Co.	£503 16 6	Wenham & Waters	£407 0 0
Drake & Gorham	496 0 0	Buchanan & Curwen‡	398 0 0
Eastlakes, Ltd.	450 0 0		
V. G. Middleton	443 0 0		

‡ Accepted, subject to the sanction of the Local Government Board.

UPTON-ON-SEVERN.—For the erection of an isolation hospital, for the Rural District Council. Messrs. Sheppard & Son, architects, 51, Foregate-street, Worcester:—

Lewis & Co.	£7,650	Sapcote & Sons	£6,348
Bromage & Evans	7,550	Wood & Sons	6,172
Panter & Sons	7,248	Giles & Son	6,155
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